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ABSTRACT

This book intends to make the contents of the standards in the eight liberal-arts subjects more accessible to teachers, parents, and the general public. Content standards identify what students are expected to know and be able to do and can provide a way to identify the knowledge and skills that society wants young people to possess. The volume is divided by subject matter: arts, civics, English-language arts, foreign language, geography, history, mathematics, and science. Each chapter presents an overview of what students who complete a K-12 education are expected to know. Each set of standards is introduced by a brief rationale for that subject, along with an explanation of specific features of that section's material and the way it was derived. Within each subject, content standards are grouped according to topic area. Following each of the numbered content standards are statements called "standard benchmarks," which identify specific expectations for learning within the more general expectation of the particular content standard. The benchmarks are also associated with certain grade levels, at the end of which students should be expected to have met that benchmark. The standard benchmarks are also annotated to indicate related benchmarks in other disciplines. (RJM)

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Standards for Excellence in Education

A Guide for Parents, Teachers, and Principals for Evaluating and Implementing Standards for Education

CBE
COUNCIL FOR BASIC EDUCATION

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Contact:
Association for Supervision and Curriculum Development
1703 North Beauregard Street • Alexandria, VA 22311-1714 USA
Phone 800-933-2723 • 703-578-9600

Standards for Excellence in Education

A Guide for Parents, Teachers, and Principals for Evaluating and Implementing Standards for Education

CBE
Council for Basic Education
An Independent Voice for Educational Excellence

4

A national advocate for high standards in K-12 education

Foreword

The Council for Basic Education (CBE) is committed to academic standards. In fact, CBE's charter documents, filed in 1956, reference the belief of the founders that all children must be held to high standards and must master a strong liberal arts curriculum as the basis for a rich life, good citizenship, and rewarding employment.

While CBE has always advocated that philosophy through our publications and fellowship programs, in the past five years we have put that into action by working with communities across the nation in helping them develop and implement strong content standards. We have worked in cities as diverse as Cleveland and Santa Barbara, in states as different as Illinois and Nevada. As we have done this work, it has become clear to us that there is a great hunger across this nation for good information, especially when it comes to what constitute good content standards.

While various disciplinary professional groups have published standards in their own fields, each has differed significantly from the others in terminology, presentation, format, and scope. We at CBE feel that if standards are to reach a large audience, they must be available and easily accessible to parents, teachers, and citizens in every community, not simply those with large staffs and adequate budgets.

This document represents CBE's attempt to bring clarity and commonality to the documents, as well as to remove overlaps and duplications. In many of the sets of standards, CBE actually reduced the material covered, as it considered the reality of the time available to learn.

We believe the result is an excellent guide to knowledge and skills that should be mastered by every child in the land. I hasten to add that we would never suggest that this document represents everything that should be taught. Each state, each community will have its own set of issues that need to be addressed: local history, ecology, and culture. The standards contained in *Standards for Excellence in Education* are not intended to be simply adopted as they are written. Local or state standards-writing teams should use them as a model. However, any parent should be able to take this document and use it to determine the adequacy of the education his or her own child is receiving. Taxpayers could use this guide to determine whether or not schools in their community measure up.

We believe you will find this a useful document, and we welcome your comments.

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The SEE advisory group gave time and their considerable expertise to ensure that the results of the project would be useful to parents, teachers, and administrators. They were

Patte Barth, *Education Trust*; Dale Beames, *Coral Springs High School*; Beverly Bimes-Michalak, *education consultant*; Rodger W. Bybee, *National Research Council*; Michael D. Casserly, *Council of the Great City Schools*; Roger Downs, *Pennsylvania State University*; Martha Jacobs Fields, *National Association of State Directors of Special Education*; Pascal D. Forgione, Jr., *National Center for Education Statistics*; Maxine Pierce Frost, *Riverside (CA) Board of Education*; Harriet Mayor Fulbright, *President's Committee on the Arts and the Humanities*; Dennis Gray, *The Education Enhancement Partnership*; Geof Hewitt, *Vermont Department of Education*; Douglas R. Jones, *Idaho House of Representatives*; Joan D. Kozlovsky, *New American Schools/Maryland*; David H. Lynn, *Kenyon Review*; Ruth Mitchell, *Education Trust*; Gary Nash, *National Center for History in the Schools (UCLA)*; Joan Peterson, *National Board Certification/Art, WestEd*; Charles N. Quigley, *Center for Civic Education*; Carolynn Reid-Wallace, *Corporation for Public Broadcasting*; Lauren Resnick, *Learning Research and Development Center (University of Pittsburgh)*; Thomas A. Romberg, *NCRMSE*; F. James Rutherford, *American Association for the Advancement of Science*; Chris Stewart, *District of Columbia Public Schools*; Susan Traiman, *The Business Roundtable*; Harriet Tyson, *education author and consultant*; Ruth Wattenberg, *American Federation of Teachers*; and Thomas E. Welch, *principal, East Jessamine (KY) High School.*

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Introduction

The overriding question about educational standards is whether they can really improve a child's education. Over the past few years a lot of talk and effort have been directed at implementing standards to reform education in the United States. People may differ in their opinions about how well their own schools work or how well the American education system is doing, but it is hard to argue with the idea that no matter how good or bad education has been, it could be better. The fate of standards-based reforms will depend on whether they contribute to that aim.

The Council for Basic Education (CBE) promotes promising efforts to improve education by means of standards. With support from several prominent national foundations, CBE launched its Standards for Excellence in Education (SEE) project, whose goal is to increase public understanding, and use of, a sound set of voluntary national standards in the liberal arts. The published *Standards for Excellence in Education* is the culmination of the SEE Project.

Standards for Excellence in Education is designed to involve everyone—parents, administrators, community leaders, state officials, students, and others—in efforts to examine education and decide whether and which standards can improve it. This document offers a reference point for looking at the quality of education in local schools and across the country, and for asking questions about what students are learning and what they should learn. This book incorporates work done by several states and by national organizations for the eight subjects of the liberal arts (arts, civics, English language arts, foreign languages, geography, history, mathematics, and science) to create a measuring stick to gauge the specific goals educators have for student learning from kindergarten through twelfth grade. The lines on the measuring stick are known as *content standards.*

Content Standards Identify Goals for Successful Student Learning

Content standards identify what students are expected to know and be able to do. They provide details for the more general, abstract goals of education by specifying what thinking and performing capabilities students should master, and what knowledge they should possess. They create a picture of the academic achievement of educated people, who may differ in all sorts of ways yet also share a common store of ideas, facts, analytical abilities, and performance skills.

For example, a content standard for English language arts could declare that students should be able to compose and polish a clear, informative essay using well-formed sentences. In geography, a standard might say that students should know how to create a map displaying different kinds of information, including a specific location and how it relates to its surroundings. A civics standard could declare that students should be able to identify a fundamental principle of the U.S. Constitution and illustrate its application to a current issue. A music content standard might require that students know how to read a simple piece of music and sing it, whereas a mathematics standard could require that they be able to convert yen into dollars and make change for a purchase in either Japan or the United States. In history, students might be expected to understand when and why the Civil War happened, and in science they might have to explain how evidence is used in scientific inquiry.

In other words, content standards identify what students are expected to learn in the various subjects as part of a good education. Each standard is detailed and specific, rather than simply saying students should know physics or be able to read and write, or that they should know "a lot" or know "more than students in Peoria or Katmandu." All the standards taken together create a complete picture of what students are expected to learn.

Content Standards Are Important

The basic premise of education is that over the course of civilization people have learned things that are worth passing along to the next generation. Education assumes that people should not have to reinvent the wheel. Rather, society will progress by showing young people whatever wheels and other useful inventions have been discovered already, so that people can roll forward from there. From science to art, we can take advantage of civilization's legacy by learning what society already knows and by learning how to make new discoveries and create new inventions. However, civilization has now reached a point where there is more knowledge than can reasonably be learned in a kindergarten through twelfth grade education.

Content standards provide a way to identify the knowledge and skills that society wants all young people to possess. Through the creation and adoption of content standards, people engage in a public process of establishing concrete guidance for the education system about what it is supposed to achieve. Content standards direct the educational process.

Content standards also serve to actually improve the quality of education. By focusing and lifting teacher and student expectations about what students are supposed to learn, standards can energize people's sense of what they are going to accomplish. By sharing these expectations in a public way, teachers communicate a consistent message about what students should learn, eliminating the gaps in learning that occur when one teacher says one thing while another says something entirely different. From classroom to classroom, school to school, and community to community, shared content standards provide a common understanding of what students should strive for and what results should occur. Parents also can see what their children are supposed to learn and what the school is committed to do so that they too can understand and contribute more positively to their children's education.

Content Standards Guide Schooling

In order to be effective, content standards must be used to coordinate the activities of various parts of the education system. Like the wheels, drive train, steering assembly, and other parts of a car, the components of an education system work more smoothly and efficiently if they are designed to go together and are properly aligned. Good teaching depends on teachers having thoughtfully prepared their classroom lessons. Good textbooks and other learning materials that are part of the school curriculum contain the information students are asked to know. Good tests or other assessments of student achievement evaluate students on whether they have learned what teachers asked them to study.

Content standards provide a way to successfully coordinate or align the various operations of the education system. They provide the various people in the system with coherent guidance for teacher preparation, textbook selection, and testing design. If everyone is steered by the same content standards, then teachers are prepared to teach what is required in the classroom, the materials they use are designed to provide appropriate information and ideas, and the tests ask students to show how much they understand of what they have been trying to learn.

Content standards create a public basis for comparing and improving schools and school support systems across districts and states. By establishing a common agreement about what the results of schooling should be, content standards focus efforts to strengthen the education system. Over

the course of their education, students often move from one school, school district, or state to another. Teachers do, too. Textbooks and tests are written with more than one local school system in mind. With content standards as a common reference point, schools of education, textbook publishers and text developers can design resources that fit well together. People can also look at particular schools to evaluate the quality of the resources the schools need in order to provide educational experiences that meet the standards. Where a school's resources are lacking, content standards offer a clear and concrete basis for identifying what needs to be provided.

The value of content standards is inherent in *what they say* students should learn and *how they are used* to help students learn. Creating and adopting standards are important steps, but real improvement in education comes when they are used to shape the actual educational experiences of students by defining what they read and learn in the classroom.

Content Standards Can Be Misused

Like any other tool or remedy, content standards can be misused, with unfortunate results. Many of the problems associated with content standards arise because of misunderstandings about what they are good for, and how they can be effective. Four of the common ways in which content standards can be misunderstood are worth explaining.

Mistake 1: Content standards determine the curriculum.

While the purpose of content standards is to guide educators' curricular decisions, content standards do not impose one single way of teaching, a particular textbook, or a specific set of lesson plans. A standard might require that students learn how to add, subtract, multiply, and divide, or understand why the American Revolution happened, but teachers still exercise considerable discretion over how best to accomplish these goals with their students, and what materials are best suited for the way they approach their lessons. Teachers can choose which ideas to combine in particular lessons and which specific illustrations or events to use to convey those ideas.

Content standards vary in their level of detail, which naturally means that some of the guidance they provide is more specific than other guidance. The proper balance must be sought: Content standards will not be effective

if they describe objectives in such minute detail that following them becomes a cumbersome and time-consuming process. At the same time, if standards are too abstract and vague, they provide no real direction at all—it appears that practically any instruction will do. Standards must be specific enough to serve the genuine purpose of helping to distinguish the kinds of lessons that fit the standards from those that do not.

Mistake 2: Each standard represents a unit of class time; more standards automatically mean more class time.

People who review content standards frequently count them all up, divide them by the length of an education, and point out how many minutes or hours students will have to learn each of the standards. This may be a useful exercise for getting a rough idea of how large a curriculum is implied by a particular set of standards, or for gauging how specific the standards' guidance is. But hasty conclusions about time commitments are often mistaken, for at least two reasons.

First, content standards do not all require the same amount of time to be met: For example, meeting a single standard that students *should be able to read and write* does not involve half as much time as meeting two standards which declare that *students should be able to read* and *students should be able to write.* Depending on their content, different standards may require more or less time to achieve. *Be able to detect bias in historical evidence* may take longer to learn than *identify the key battles of World War II.*

Second, students can be working to meet more than one standard at a time. Consider the case of a student writing up a physics experiment about colliding objects. Such a student may well be learning about (1) a particular principle of Newton's laws of motion, (2) how to use research evidence to test a hypothesis, (3) how to apply mathematical operations in scientific experiments, and (4) how to write effectively for a particular audience. These four learning objectives may be reflected in four different content standards, and yet the student may be working toward them all at the same time.

Introduction

Mistake 3: Content standards automatically exclude local content.

There is no reason why content standards have to identify every learning objective for students in a particular school. Content standards should define what students should know or be able to do no matter where they live and go to school, but part of any school's curriculum and class time can be set aside for lessons the content standards do not cover. Even national content standards do not exclude local content, and may be adapted to instruction devoted to particular local concerns. If you live in Wyoming, then a national history standard that calls for students to understand how agriculture, mining, and ranching were transformed between 1870 and 1900 also concerns local history; if you live in Philadelphia, the same can be said about the standard that asks students to understand how and why the Declaration of Independence took the shape it did. If a geography standard concerns the relationship between the land and what lives on it, local topography can serve as the basis for learning. A civics standard that calls for understanding the relationship between state and local government allows students to use their own community and state as examples.

Mistake 4: Content standards by themselves will improve the system.

If content standards are written, approved, and then put in the closet, they will only help mice and school officials. Content standards are not what teachers know how to teach, they are not textbooks, and they are not tests. Until and unless they are used to inform and coordinate the various elements of formal educational activity, content standards will not have a significant effect on student learning. Having standards is one thing; using them is another. Only if teachers and the public ask how the standards are being used to shape students' educations do they offer hope of making education better.

This is not a simple or quick job. Trumpeting the creation of standards and handing them out in bright, shiny covers may temporarily attract public attention and approval, but this step alone does nothing to improve students' education. It takes considerable time to develop and refine good standards, but even this task is relatively easy compared to the hard work of reshaping teacher education, textbooks, student assignments, and tests. Providing the means to support the work that will improve education, and doing it, are essential to standards-based reform.

The Design and Organization of the *Standards for Excellence in Education* Standards and Benchmarks

The following chapters present an overview of what students who complete a kindergarten through twelfth grade education should know and be able to do. In some areas, the content standards reflect what is already expected of students in the United States; in others, they represent what students should be aspiring to learn, even though many schools do not yet require it. Hopefully, calling for schools to include these objectives in their work will benefit the education of all students in the United States.

Standards are presented in the eight subjects of liberal arts education: the arts, civics, English language arts, foreign language, geography, history, mathematics, and science. Each set of standards is introduced by a brief rationale for that subject, along with an explanation of specific features of that section's material and the way it was derived. Within each subject, content standards are grouped according to topic area. Standards are numbered consecutively within each subject area.

Following each of the numbered content standards are statements called *standard benchmarks*, which identify specific expectations for learning within the more general expectation of the particular content standard. The benchmarks are also associated with certain grade levels (usually fourth, eighth, and twelfth grades) at the end of which students should be expected to have met that benchmark. Of course, depending on the particular benchmark and the school's curriculum, different students might meet the learning benchmark at different times during the specified grade span. The standard benchmarks are presented in a way that allows the reader to look at related benchmarks for earlier and later grade spans, in order to enlarge their understanding of the particular benchmarks. This format makes it easier to see what related learning should already have taken place, and to anticipate future learning that will build on what students learn in the earlier grades.

The standard benchmarks are also annotated to indicate related benchmarks in other discipline areas. While the standards are organized in a way that emphasizes the coherence of each discipline, it is also useful to know where to find related benchmarks in other disciplines. Teachers may be especially interested in these interdisciplinary connections in terms of

their potential for integrating the disciplines in their instructional planning. Connections are identified when there is a clear and unavoidable relationship between the benchmarks.

Readers are bound to see many more important connections among benchmarks besides those identified. Certainly, within each discipline are benchmarks that are closely connected to each other. There are also connections of varying strengths among benchmarks across the different subjects. For the purposes of curriculum planning, teachers will find many ways to invent lessons that address several benchmarks together. Even several conceptually unrelated ideas might be pursued in a particular unit because the instructional setting for one also provides a good opportunity for teaching another. While studying a meadow stream, for example, students might learn about insects and erosion as well as fish, poems and songs about streams, and ways of measuring flow rates.

For a given learning benchmark, the notation for interdisciplinary connections is as follows: The first letter represents the related discipline. (Thus A stands for arts, C for civics, E for English language arts, F for foreign language, G for geography, H for history, M for mathematics, and S for science.) This is followed by the number for the content standard, then the grade level, and finally a small letter representing the specific standard benchmark. For example, the notation "G2.12a" after a benchmark would refer the readers to the geography standards, standard 2, grade 12, benchmark a.

All the disciplines require students to acquire both knowledge and skills. Most of the content standards in this book are organized to present the standards about skills first, followed by the standards about knowledge. This is because skills are applied widely across the entire discipline. Readers should keep skills in mind when looking through each of the topic areas within that discipline. In addition, this format makes it possible to emphasize the inclusion of both skills and knowledge in each discipline. Grouping skills together should not be taken to mean that they are actually taught separately from the knowledge. On the contrary, skills and knowledge should be taught together, to give real substance to the various capacities students learn to exercise.

Readers may notice that while some benchmarks relate to numerous benchmarks in other disciplines, others do not. For example, benchmarks concerned with writing and other forms of communication are important

across the curriculum, since the transmission of knowledge and understanding is central to all subjects. Also, many subjects rely heavily on the application of mathematical skills. In general, benchmarks that focus primarily on skills are often connected to standards in other disciplines, due to the similarities among the kinds of reasoning and activity they require. At the same time, skills exhibit a distinctive form in each discipline, so *Standards for Excellence in Education* does not collapse them together or separate them from their respective subject matters.

The Origins of the *Standards for Excellence in Education* Standards

Most of the standards in *Standards for Excellence in Education* were developed from preexisting work done by various national organizations of experts in the various disciplines. With support from numerous groups and concerned members of the public, these national organizations carried out careful, sustained efforts to develop standards describing what students should know and be able to do in their respective disciplines. For the most part, our standards are directly derived from those national standards. More specific information about the relationship between *Standards for Excellence in Education* standards and previous work is given in the introductions to individual disciplines.

Standards for Excellence in Education does depart in certain general ways from the national standards documents from which it was developed. The aim of this book is to make the contents of the standards in the eight liberal arts subjects more accessible to teachers, parents, and the general public; this aim shapes *Standards for Excellence in Education's* form. The most obvious difference is that this book is much shorter than the original documents from which it was derived. Most of this condensation of the content standards was accomplished by dropping extraneous material from the original publications that explained, elaborated, or illustrated the standards in various ways.

In addition, the format of the original standards has been altered for *Standards for Excellence in Education* to make it as consistent as possible across disciplines. (The original documents were developed independently from one another, which resulted in substantially different formats.) And, of course, the interdisciplinary connections do not exist in the original documents.

Introduction

The English language arts and mathematics standards, however, have not been drawn from national standards. Substantial work with teachers and administrators as they developed their own state or local standards convinced the CBE staff that documents other than the national standards would be better suited to providing guidance for educators in those subjects. (In fact, the National Council of Teachers of Mathematics, which developed the national mathematics standards, is revising them; a first draft is expected out in Fall 1998.) More detail about CBE's choice in this matter can be found in the introductory essays for English language arts and mathematics.

Standards for Excellence in Education standards also differ from the original documents in other subtle ways. In the course of rewriting and revising, CBE has reorganized the original material, adding to it in some places and deleting some in others. Changes in emphasis and detail have been made. The SEE project's goal is to focus attention on what is most important for all American students to learn. The SEE project aims to make the standards as clear as possible, to make them challenging, and to present an optimistic yet reasonable vision of what a liberal arts education should be.

At the same time, the SEE project based its efforts to create this publication on the assumption of the integrity of the original documents. CBE decided to pursue this project because it believes in the value of the work done by the original standards' creators, and it seeks to build upon their achievements. Interested readers are invited to compare this book to the original documents, either to acquaint themselves with the much greater detail and explanation of the standards they will find there, or to compare their quality and the ways in which they differ. (To obtain the original documents, please refer to the contact information provided at the beginning of each subject section and in appendix B.)

Arts Standards

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Arts Standards Introduction

The arts fill a need in us that transcends race, age, or geography—the need to express the very core of our being. The expression of that need is perhaps best seen in very young children, who fill every surface they can with exuberant scribbles, who stand up at concerts and unabashedly dance to the music, and who play "let's pretend" in a thousand variations. If we don't always express ourselves so freely as we grow older, we still play "air guitar" or dance with our sweetheart to "our" song, we flock to the hit musicals, or we stand in line for hours in the freezing cold to get tickets to a once-in-a-lifetime art exhibition. Whether we appreciate someone else's work or create our own, the arts provide personal fulfillment. They free our expression from the restraints of the more workaday world and help us to explore and answer deep questions of humanity.

We remember and respect great societies not just for their military might or their economic strength, but for the enduring legacy of their arts: the dances of Asian and Middle Eastern cultures, the explosion of painting in the Renaissance, the theatrical tradition of the Greeks, the soul-touching rhythms of African music. This legacy of great art enriches our lives, creates cultural bonds, and gives us joy. Great art helps us understand the world and one another.

On a more pragmatic level, the arts have economic importance. The film and fashion industries pour billions of dollars into the nation's coffers. Graphic artists and designers, architects, and musicians all contribute in significant ways to the economic well-being of our nation.

While few of us will become trained artists employed in the theatre, or in design, or sing or sculpt for a living, all of us benefit from an education in the arts, because knowledge increases appreciation. A well-focused arts education promotes self-discipline and helps students learn to think and solve problems in new ways. It teaches students how to handle ambiguity and lends an understanding that in life there is not always "one right answer" (Which is the right shade for this shadow? How do I convey grief in a gesture?).

The Standards for Excellence in Education (SEE) arts standards outline what students need to know and be able to do to appreciate, understand, and use the arts creatively, skillfully, and with satisfaction. Students should acquire knowledge about works of art—great music, paintings, and sculptures; they should know how theatre illuminates the human experience,

understand how dance can convey meaning in a way different from the way we use our bodies for sport or everyday tasks. Students should also be able to create and perform in the arts, for great works are best appreciated by those who themselves have tried to create, and who understand the struggle to express the intangible in sound, movement, or image.

As did the national arts standards, the SEE arts standards implicitly set forth five overall goals:

- Students should be able to communicate at a basic level in the four arts disciplines: dance, music, theatre, and the visual arts.
- Students should be able to communicate proficiently in at least one art form.
- Students should be able to develop and present basic analyses of works of art.
- Students should have an informed acquaintance with exemplary works of art from a variety of cultures.
- Students should be able to relate various types of arts knowledge and skills within and across the arts disciplines.
  (National Standards for Arts Education, pages 32-33)

In keeping with these goals, the SEE arts standards, like the national standards upon which they are based, present expectations that students will actively participate in the creation and performance of the arts. They will also know the content of the arts—that is, be able to place works in their historical and cultural context and understand how these works inform us about human societies.

The standards are organized by individual discipline—dance, music, theatre, and visual arts. These are followed by "Connections," a standard that asks students to think and act across the arts disciplines. Finally, the "History of the Arts" section sets forth expectations for historical knowledge of the four arts disciplines.

The discipline-specific standards are largely focused on skill, though it is the nature of the arts that knowledge of the disciplines is woven into these standards. A student studying dance, for instance, needs to know the traditions and techniques of classical dance forms in order to perform them. Music students must sing music representing diverse genres, such as classical, jazz, and folk, and cultures such as Latin, Caribbean, and Western European. Skill and knowledge cannot be separated in these standards.

Arts Standards Introduction

All students through grade 8 should accomplish the standards in each of the four arts disciplines. In grades 9 to 12, students are expected to specialize in one of the disciplines. All students should achieve the standards on connections and history. These are ambitious goals and will not be easy to reach without well-trained arts teachers and appropriate materials. Reaching higher in all subject areas is the very reason for writing and using academic standards. No less than the other subjects, rigorous study of the arts is an essential element of all students' education.

The *National Standards for Arts Education* can be obtained by calling 1-800-828-0229 or by writing to:

MENC Publication Sales
1806 Robert Fulton Drive
Reston, Virginia 22091

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1. Students will identify and use movement elements and skills in performing dance.

By the end of grade 4:

a. Accurately demonstrate nonlocomotor movements (such as bend, twist, stretch, and swing).

b. Accurately demonstrate the eight basic locomotor movements (i.e., walk, run, hop, jump, leap, gallop, slide, and skip), traveling in straight and curved pathways, forward, backward, sideward, diagonally, and turning.

c. Create shapes at low, middle, and high levels.

d. Move accurately to a musical beat and respond to changes in tempo.

e. Demonstrate personal kinesthetic* awareness, concentration, and focus in performing movement skills.

f. Accurately describe the action (such as skip or gallop) and movement elements (such as levels or directions) in a brief movement study.

By the end of grade 8:

a. Demonstrate the movement skills and explain the underlying principles of alignment, balance, initiation of movement, articulation of isolated body parts, weight shift, elevation and landing, fall, and recovery.

b. Accurately identify and demonstrate basic steps, positions, and patterns for dance from a variety of different styles or traditions (e.g., ballet, square, Ghanaian, Middle Eastern, modern); describe the role of dance (e.g., social, folk, theatrical) in at least two different cultures or time periods. F5.8c; F9.8e

c. Accurately transfer visual images into dance movements and aural rhythmic patterns into dance rhythmic patterns.

d. Identify and clearly demonstrate a range of movement qualities such as float, dab, punch, and glide.

e. Demonstrate accurate memorization and reproductions of movement sequences.

f. Accurately describe the action (such as skip or gallop) and movement elements (such as levels or directions) in brief movement studies using appropriate vocabulary.

* Refers to the ability to perceive bodily position, weight, or movement of the muscles, tendons, and joints.

DANCE

By the end of grade 12:

a. Demonstrate appropriate strength, flexibility, agility, coordination, skeletal alignment, and body-part articulation in locomotor and nonlocomotor movements.

b. Identify and demonstrate longer and more complex steps and patterns from two different dance styles or traditions.

c. Move accurately to complex rhythms.

d. Create and perform combinations and variations of dance skills, with projection, in a broad dynamic range.

2. Students will understand choreographic principles, processes, and structures.

By the end of grade 4:

a. Create a movement sequence with a beginning, middle, and end, both with and without rhythmic accompaniment.

b. Create and perform dances based on student's own ideas and on concepts from other sources.

c. Use improvisation to discover and invent movement and to solve movement problems.*

d. Create a dance phrase, accurately repeat it, and then vary it (making changes in the time, space, and/or force/energy).

e. Demonstrate the following partner skills: copying, leading and following, and mirroring.

By the end of grade 8:

a. Clearly demonstrate movement principles, such as contrast between movements, transition from one dance phrase to the next; processes such as reordering of movement within a dance; and chance.

b. Successfully demonstrate the structures or forms of AB, ABA, canon, call and response, and narrative.

c. Work effectively in a small group during the choreographic process.

d. Demonstrate the following partner skills in a visually interesting way: creating contrasting and complementary shapes, and taking and supporting weight.

By the end of grade 12:

a. Use improvisation to generate movement for choreography.

b. Demonstrate understanding of structures or forms (such as palindrome, theme and variation, rondo, round, and contemporary forms selected by the student) through brief dance studies.

c. Choreograph a duet demonstrating an understanding of choreographic principles, processes, and structures.

* Predetermined requirements or limits of time, space, and rhythm in dance (e.g., move from A to B in three beats).

3. Students will understand dance as a way to create and communicate meaning.

By the end of grade 4:

a. Discuss how dance is different from other forms of human movement (such as sports and everyday gestures).

b. React to and interpret a dance, using appropriate dance vocabulary.

c. Create and perform a dance to intentionally communicate meaning; describe the dance elements that were used to convey the meaning.

By the end of grade 8:

a. Effectively demonstrate the difference between pantomiming and abstracting a gesture.

b. Demonstrate or explain how different accompaniment (such as sound, music, or spoken text) and lighting and costuming can affect the meaning and interpretation of a dance.

c. Create a dance that successfully communicates a topic of personal significance.

By the end of grade 12:

a. Formulate and answer questions about how movement choices communicate abstract ideas in dance.

b. Demonstrate understanding of how personal experience influences the interpretation of a dance.

c. Create a dance that deliberately and effectively communicates a complex idea.

4. Students will apply and demonstrate critical and creative thinking skills in dance.

By the end of grade 4:

a. Invent and test multiple solutions to a given movement problem; choose a favorite solution and discuss the reasons for that choice.

b. Discuss how two dances are similar and different in terms of one of the elements of dance (such as space) by observing body shapes, levels, and pathways.

By the end of grade 8:

a. Create a movement problem and demonstrate multiple solutions; describe the advantages and disadvantages of each.

b. Explain and justify opinions about performed dances.

c. Compare and contrast two dance compositions in terms of space (such as shape and pathways), time (such as rhythm and tempo), and force/energy (movement qualities).

d. Identify possible aesthetic criteria (such as skill of performers, originality, visual and/or emotional impact, variety, and contrast) for evaluating dance.

By the end of grade 12:

a. Create a dance and revise it over time, explaining the reasons for the student's artistic decisions and what was lost or gained by those decisions.

b. Establish a comprehensive set of aesthetic criteria and use it to evaluate the student's own work and that of others.

c. Formulate and answer philosophical questions about dance (What is it that makes a particular dance that dance? How much can one change that dance before it becomes a different dance?).

5. Students will sing, alone and with others, a varied repertoire of music.

By the end of grade 4:

a. Sing accurately and expressively, maintaining a steady tempo; sing from memory a varied repertoire of simple songs.

b. Sing ostinatos, partner songs, and rounds.

c. Respond to the cues of a conductor when performing in a group.

By the end of grade 8:

a. Sing accurately and with good breath control throughout their singing ranges, alone and in ensembles, and including music written in two and three parts (i.e., soprano, alto, and bass).

b. Sing with expression and technical accuracy a repertoire of simple vocal literature with a level of difficulty of 2 (on a scale of 1 to 6*), including some songs performed from memory.

c. Sing music representing diverse genres (such as classical, jazz, folk, and pop) and cultures (such as Latin, African, Caribbean, and Western European), with expression appropriate for the work being performed.

By the end of grade 12:

a. Sing with expression and technical accuracy a large and varied repertoire of vocal literature with a level of difficulty of 4.

b. Sing music written in four parts (i.e., soprano, alto, tenor, and bass), demonstrating well-developed choral ensemble skills.

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* Level 1: Very easy. Easy keys, meters, and rhythms; limited ranges.
Choral: "Amazing Grace," American hymn, arr. W. Hall. Anaheim, CA: National Music Publishers. SATB.
Instrumental: "In the Hall of the Mountain King," from *Peer Gynt Suite* no. 1, by E. Grieg, arr. S. Carlin. Oakhurst, CA: Carlin Music Publishing. Orchestra.
Level 2: Easy. May include changes of tempo, key, and meter; modest ranges.
Choral: "Simple Gifts," by A. Copland, arr. I. Fine. New York: Boosey & Hawkes. SA.
Instrumental: "Trepak," from *Nutcracker Suite*, by P. Tchaikovsky. Cleveland: Ludwig Music Publishing. Orchestra.
Level 3: Moderately easy. Contains moderate technical demands, expanded ranges, and varied interpretive requiremen
Choral: "Bring a Torch, Jeanette Isabella," French carol, arr. D. Schultz. New York: Boosey & Hawkes. SA.
Instrumental: "Chorale Prelude: For the Beauty of the Earth," by C. Kocher, arr. C. Smith. Milwaukee: Jenson/Hal Leonard Corporation. Band.
Level 4: Moderately difficult. Requires well-developed technical skill, attention to phrasing and interpretation, and ability to perform various meters and rhythms in a variety of keys.
Choral: "All the Pretty Little Horses," American folk song, arr. A. Frackenpohl. SSA. Milwaukee: Hal Leonard Corp.
Instrumental: "Jesu, Joy of Man's Desiring," by J. S. Bach, arr. A. Reed. Oskaloosa, IA: C. L. Barnhouse. Band.
Level 5: Difficult. Requires advanced technical and interpretive skills; contains key signatures with numerous sharps or flats, unusual meters and rhythms, subtle dynamic requirements.
Choral: "Hallelujah Chorus," from *Messiah*, by G. F. Handel. New York: Carl Fischer. SATB.
Instrumental: "Russian Sailors' Dance," from *Red Poppy*, by R. Glière, arr. M. Isaac. New York: Carl Fischer. Orchestra.
Level 6: Very difficult. Suitable for musically mature students of exceptional skill.
Choral: "Alleluia," by R. Thompson. Boston: E. C. Schirmer. SATB.
Instrumental: "Overture," from *Candide*, by L. Bernstein. New York: G. Schirmer. Orchestra.
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6. Students will perform on instruments, alone and with others, a varied repertoire of music.

By the end of grade 4:

a. Perform a varied repertoire of music, on pitch, in rhythm, and maintaining a steady tempo.

b. Perform simple rhythmic, melodic, and chordal patterns and echo short rhythms and melodic patterns accurately and independently on classroom instruments (such as recorder, simple percussion instruments, or chorded zither).

c. Perform instrumental literature with a level of difficulty of 2, on at least one instrument, accurately and independently, alone and in ensembles, with good posture, good playing position, and good breath, bow, or stick control.

d. Respond to the cues of a conductor when performing in a group.

By the end of grade 8:

a. Perform music representing diverse genres and cultures, with expression appropriate for the work being performed.

b. Play by ear simple melodies and accompaniments.

c. Perform independent instrumental parts (e.g., simple rhythmic or melodic patterns, contrasting rhythmic lines, harmonic progressions, and chords) while other students sing or play contrasting parts.

By the end of grade 12:

a. Perform with expression and technical accuracy a large and varied repertoire of instrumental literature with a level of difficulty of 4.

b. Perform a part in an ensemble with one student on a part, demonstrating well-developed ensemble skills.

7. Students will improvise melodies, variations, and accompaniments, and will create and arrange music within specified guidelines.

By the end of grade 4:

a. Improvise "answers" in the matching style to given simple rhythmic and melodic phrases.

b. Improvise short songs and instrumental pieces, using a variety of sound sources.

c. Create and arrange short songs and instrumental pieces within specified guidelines, including music to accompany readings or dramatizations.

By the end of grade 8:

a. Improvise simple harmonic accompaniments.

b. Improvise short melodies, unaccompanied and with given rhythmic accompaniments, each in a consistent style, meter, and tonality.*

c. Create short musical pieces within specified guidelines (e.g., a particular style, form, instrumentation, or technique), demonstrating how the elements of music are used to achieve unity and variety, tension and release, and balance.

d. Arrange musical pieces for multiple voices or instruments.

By the end of grade 12:

a. Improvise appropriate harmonizing parts.

b. Improvise rhythmic and melodic variations on given melodies in a five-tone musical scale and melodies in major and minor keys.

c. Improvise original melodies with given chord progressions, each in a consistent style, meter, and tonality.

d. Compose music in several distinct styles, demonstrating creativity in using the elements of music for expressive effect.

e. Arrange pieces for voices or instruments other than those for which the pieces were written, in ways that preserve or enhance the expressive effect of the music.

f. Compose and arrange ensemble music for voices and acoustic or electronic instruments, demonstrating knowledge of the ranges and traditional usages of the sound sources.

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* Tonality: The harmonic relationship of tones with respect to a definite center or point of rest; fundamental to much of Western music beginning in the 1600s.

8. Students will read and notate music.

By the end of grade 4:

a. Use a system (i.e., syllables, numbers, or letters) to read simple pitch notation in the treble clef in major keys.

b. Identify and use standard notation symbols for meter, pitch, rhythm, dynamics, tempo, articulation, and expression in simple patterns presented by the teacher; interpret them correctly when performing.

c. Read and notate whole, half, quarter, and eighth notes and rests in 2/4, 3/4, and 4/4 meter signatures.

By the end of grade 8:

a. Identify symbols and traditional terms referring to pitch, dynamics, tempo, articulation, and expression.

b. Read and notate notes (including sixteenth and dotted notes) and rests in 2/4, 3/4, 4/4, 6/8, 3/8, and alla breve meter signatures; read at sight simple melodies in both the treble and bass clefs.

c. Use standard notation to record student's own musical ideas and the musical ideas of others.

By the end of grade 12:

a. Read an instrumental or vocal score of up to four staves.

b. Sight-read, accurately and expressively, music with a level of difficulty of 3.

9. Students will listen to, analyze, and evaluate music.

By the end of grade 4:

a. Identify simple music forms when presented aurally.

b. Use appropriate terminology to explain personal preferences for specific musical works and styles; devise appropriate criteria for evaluating performances and compositions.

c. Identify various instruments by ear, including many orchestra and band instruments, and instruments from various cultures, as well as children's voices and male and female adult voices.

By the end of grade 8:

a. Describe specific music events (e.g., entry of oboe, change of meter, or return of refrain), using appropriate terminology.

b. Describe the uses of pitch, rhythm, harmony, dynamics, timbre, texture, and form in examples of musical works representing diverse genres and cultures.

c. Develop criteria to evaluate the quality and effectiveness of music performances and compositions; use the criteria as student listens and performs.

By the end of grade 12:

a. Analyze aural examples of a varied repertoire of music, representing diverse genres and cultures, by describing pitch, rhythm, harmony, dynamics, timbre, texture, form, and expression and correctly using an extensive technical vocabulary of music.

b. Describe compositional devices and techniques used in a piece of music (e.g., to provide unity and variety, or tension and release); give examples of other works that make similar use of these devices and techniques.

c. Develop specific criteria for making critical evaluations of the quality and effectiveness of performances, compositions, arrangements, and improvisations; apply the criteria while listening and performing; compare the musical performance to similar or exemplary models.

10. Students will write and improvise scripts based on personal experience and heritage, imagination, literature, and history.

By the end of grade 4:

a. Work with classmates to create dramatizations (including development of interrelated characters, environments, and situations). F3.4b

b. Improvise dialogue to tell stories. F3.4c; S25.2b

c. Formalize improvisations by writing or recording the dialogue, environment, and situation.

d. Use information gained from research (print and nonprint sources) to inform scriptwriting. F3.4b

By the end of grade 8:

a. Develop, individually and in groups, characters, environments, and actions that create tension and suspense. E3.8b

b. Refine dialogue, situation, and environment to better convey intended ideas; record dialogue using appropriate vocabulary and notation. E5.8a

c. Use research information about people, events, time, and place to create appropriate characterizations and dramatic environments for classroom dramatizations. F4.8a; F3.8a; E3.8cd

By the end of grade 12:

a. Construct imaginative, complex scripts and refine them in collaboration with actors so that story and meaning are conveyed to an audience. E4.12eh; E5.12a

b. Use information from research on the cultural, historical, and symbolic clues in dramatic texts to assist in creating scripts for classroom and formal productions. E3.12aeg; E5.12f; E8.12d

11. Students will act (develop, communicate, and sustain characters) in improvisations and classroom or formal productions.

By the end of grade 4:

a. Sustain characters with consistency in classroom dramatizations, using variations of movement and speech to develop and differentiate characters. F2.4f; E7.4c; E8.4d

b. Use information gained from research (print and nonprint sources) to inform acting. E3.4c; E3.8c; E7.12i

c. Describe elements of dramatic performances that produce an emotional response in oneself or an audience. S27.2a

By the end of grade 8:

a. Evaluate descriptions, dialogue, and actions to express and justify character motivation.

b. Invent character behavior based on observations of people in the real world. S27.5a; S28.5b and 8b

c. Develop characterizations appropriate for the dramatization by using such acting skills as sensory recall, concentration, breath control, diction, body alignment, and control of isolated body parts. E7.12l; E8.8d

d. Interact in a cast as the invented characters.

By the end of grade 12:

a. Analyze the physical, emotional, and social dimensions of characters found in dramatic texts from various genres (such as tragedy, comedy, romance, and thriller) and media (such as stage, film, and improvisation). E3.8c; L2.a; E7.12ai; E8.12e

b. Compare and demonstrate various classical and contemporary acting techniques and methods.

c. Create and sustain characters, in a cast, to communicate an intended idea and tell a story. E7.12g

d. Respond appropriately to directional choices for improvised and scripted scenes.

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12. Students will conceptualize and create environments, including sets, lighting, and sound, for classroom or formal productions.

By the end of grade 4:

a. Plan several possible sets for a classroom dramatization; construct designs using visual elements (such as space, color, line, shape, texture, and lifting); select a variety of sounds to communicate locale and mood, and create appropriate costumes. M3.3ae and 4abc; F3.4b

b. Establish space for classroom dramatizations and collaborate to safely organize available materials for scenery, properties, lighting, sound, costumes, and makeup.

c. Use information gained from research (print and nonprint sources) to inform scene and production design.

By the end of grade 8:

a. Use technical knowledge and skills to develop set designs for dramatic environments and safely create functional scenery, properties, lighting, sound, costumes, and makeup to clearly support the text. E5.12f

b. Explain the functions and interrelated nature of scenery, properties, lighting, sound, costumes, and makeup in creating an environment appropriate for the drama. E5.12f

c. Explain how culture affects the production of dramatic performances. F3.8a

d. Use previously established criteria to constructively evaluate the effectiveness of the production of dramatic performances. E7.8a

By the end of grade 12:

a. Develop focused ideas for the dramatic environment of scripted and improvised scenes, using visual elements (line, texture, color, and space), visual principles (repetition, balance, emphasis, contrast, and unity), and sound qualities (pitch, rhythm, dynamics, tempo, and expression) from traditional and nontraditional sources. E5.12f; E7.12gj; E8.12d

b. Use information from research on the cultural, historical, and symbolic clues in dramatic texts to develop appropriate dramatic environments for classroom and formal productions. E5.12fj; E8.12d

c. Describe and analyze the effect of publicity, study guides, programs, and physical environments on audience response and appreciation of dramatic performances; design coherent stage management, promotional, and business plans.

13. Students will direct informal or formal dramatic activities by interpreting texts and organizing and conducting rehearsals.

By the end of grade 4:

a. Collaborate with actors to plan and prepare improvisations.

b. Demonstrate various ways to stage classroom dramatizations and describe how each choice influences the meaning of the dramatization.

By the end of grade 8:

a. Lead small groups in planning visual and sound elements of a dramatization.

b. Lead rehearsal of improvised and scripted scenes, communicating information to cast and crew about people, events, time, and place to create appropriate characterizations and dramatic environments. E3.8cd; F3.4a

c. Use previously established criteria to constructively evaluate the effectiveness of the direction of dramatic performances.

By the end of grade 12:

a. Develop and justify multiple interpretations of a dramatic text; develop visual and sound choices for scripts and dramatic ideas, choosing those that are most interesting and which best convey dramatic intent. E5.12f; E8.12d

b. Effectively communicate to a cast directional choices for improvised or scripted scenes, using information from research on the cultural, historical, and symbolic clues in dramatic texts to assist in directing classroom and formal production. E3.12g; E5.12a; E7.12g

c. Compare and contrast perceived artistic intent with the final aesthetic achievement of dramatic texts and productions. E5.12f; E7.12c

14. Students will effectively use visual arts media, techniques, and processes, with an understanding of how the creation of visual art is influenced by the artist's purpose.

By the end of grade 4:

a. Describe how people's experiences influence choice of subject matter, symbols, and ideas in the development of visual art.

b. Select, justify, and use subject matter, symbols, and ideas to communicate meaning in works of visual art. S5.2b and 5b

c. Describe visual characteristics (e.g., color, texture, and form) and purposes of art (e.g., commercial, personal, and communal) and how the characteristics and purposes are used to shape ideas through art. S12.2a

d. Understand that works of visual art are created for various purposes (such as personal or political expression, or commerce). C1.4a; S3.2c

By the end of grade 8:

a. Select visual arts media, techniques, and processes to create a work of visual art to communicate an intended idea; analyze what makes these choices effective. C2.8b; F5.8a; S5.5b; S4.8b

b. Explain how visual features and organizational principles (such as repetition, balance, emphasis, contrast, and unity) can be used effectively to convey ideas and meaning and explain what makes them effective.

c. Integrate subject matter with visual and spatial effects, including those intended to create a different period in time, to communicate intended meaning in their artworks.

By the end of grade 12:

a. Use visual arts media, techniques, and processes with skill and aesthetic awareness to produce intended result.

b. Use visual characteristics and organizational principles to solve specific art problems in the creation of visual art.

c. Explain how history, current events, a variety of cultures, and the philosophy of aesthetics influence artists' visual works, including the student's own. G6.8e; G6.12a

15. Students will evaluate the effectiveness of a range of subject matter, symbols, and ideas for use in the creation of visual art, with an understanding of how the perception of visual art is influenced by the artist's purpose.

By the end of grade 4:

a. Know the differences between visual arts materials, techniques, and processes and how they prompt different viewer responses.

b. Describe how visual features and organizational principles (such as repetition, balance, emphasis, contrast, and unity) can be used to influence the viewer's emotional response to works of art.

c. Understand that viewer responses to the same work of art can differ, due to personal experience and knowledge. S25.5a

By the end of grade 8:

a. Compare and contrast purposes for creating works of art (e.g., political, commercial, religious, and personal expression) and describe how these purposes influence the artist's development of the work and the viewer's perception of it. H6.4a; H25.4a; H32.4c

By the end of grade 12:

a. Explain how subjects, themes, and symbols convey contexts, values, and aesthetics in works of visual art.

b. Describe the relevant circumstances behind the production of a wide variety of works of art.

c. Analyze multiple critical reviews of various works of art and evaluate the merit of these reviews.

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16. Students will understand relationships among the arts and with disciplines outside the arts, and use that knowledge to strengthen work in the arts.

By the end of grade 4:

a. Understand and use similarities and differences between key features of the arts disciplines.

b. Identify connections between the arts and other disciplines in the curriculum and give specific examples of how an understanding of one discipline can strengthen understanding of another.

c. Demonstrate audience behavior appropriate for the context and style of music, dance, or theatre performed.

By the end of grade 8:

a. Compare how the characteristic materials (i.e., sound in music, visual stimuli in visual arts, movement in dance, and human interrelationships in theatre) of two or more art forms can be used to transform similar events, scenes, emotions, or ideas into various works of art.

b. Describe ways in which the principles and subject matter of other disciplines taught in the school are similar to or different from the principles and subject matter of the four arts disciplines.

c. Compare functions served by art and artists in each of the four arts disciplines.

d. Compare and contrast how themes are expressed in the four arts disciplines, using examples from various cultures and historical periods.

By the end of grade 12:

a. Explain and cite examples of how elements, artistic processes (such as imagination or craftsmanship), and organizational principles (such as unity and variety or repetition and contrast) are used in similar and distinctive ways in the various arts.

b. Analyze how the characteristics of the four arts disciplines within a particular historical period or style influenced, and were influenced by, ideas, issues, and themes in the humanities or sciences.

HISTORY OF THE ARTS

17. Students will know the history, characteristics, and purposes of the arts, and of specific works, from various times, places, and cultures.

By the end of grade 4:

a. Identify specific works of art in each of the arts disciplines as belonging to particular cultures, times, and places, including major works from the Western tradition and at least one non-Western culture.

b. Describe how history and culture can influence the creation of works in each of the arts disciplines. F5.4b; F9.8e; G9.4c; H7.4a; H9.4c; H20.4b

c. Describe distinguishing characteristics representative of music, visual art, theatre, and dance genres and styles from a variety of cultures, including those found in the student's own community. F9.4d; G9.4c; H20.4b; H7.4a; H9.4c

By the end of grade 8:

a. Know a brief outline of the major historical periods of the four arts disciplines.

b. Compare and contrast the characteristics of works in two or more art forms that share similar subject matter, historical period, or cultural context, and explain the influence of the subject, period, or context. G9.8d

c. Identify the elements and techniques characteristic of music, theatre, visual arts, and dance of various styles and cultures. F5.86; F9.8e; G9.8b

d. Classify by genre and style (and if applicable, by historical period, creator, and title) a varied body of works in the four arts disciplines.

e. Describe the characteristics of exemplary works from the Western tradition and at least two non-Western cultures in each of the four arts disciplines; explain how those characteristics make the works exemplary.

f. Describe how factors of time and place (such as resources, ideas, and technology) influence features that give meaning and value to a work in each of the arts disciplines. G9.8b; H5.6d

By the end of grade 12:

a. Present extensive information about art and artists in dance, music, theatre, and the visual arts in the twentieth century, and analyze their influence in contemporary society.

b. Classify by genre or style, and by historical period or culture, unfamiliar but representative examples of music, visual arts, theatre, and dance, and explain the reasoning behind the classifications.

c. Identify sources of the arts in America, trace the evolution of those forms, and cite well-known performers, creators, and representative works associated with them. H7.4a; H9.4c; H20.4b; H26.4b

d. Describe major works of dance, music, theatre, and visual art and their place in the history of art, from the classical to the postmodern periods.

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Civics Standards

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Civics Standards Introduction

A story is told that, as the Constitutional Convention closed, a reporter caught the departing Benjamin Franklin and demanded of him, "Dr. Franklin, what kind of a government have you given us?" Franklin replied, "A republic—if you can keep it." The convention and its resultant constitution were considered so vital to the new nation's well-being that extra hay was ordered to be strewn upon the cobblestones of the streets surrounding the State House in Philadelphia (now known as Independence Hall) so that the delegates meeting in its Assembly Room would not be distracted in their task of creating that republic's foundation. No less can the noise of the modern world be allowed to keep us from devoting ourselves to renewing the spirit and practice of American republican democracy. Such activity requires citizens who understand our democracy's roots and growth and its relationship to a fertile civil society.

Alexis de Tocqueville described democracy as "self-interest, rightly understood." A healthy democracy requires citizens who appreciate the democratic process and endorse its objectives. The distinctively American reliance on voluntary associations of citizens for a wide variety of civic purposes underscores the importance of people's understanding of the public interest and how it may be served. Civic leaders and accomplishments may be found in many walks of public life, not just politics and government. If democracy is to flourish, its citizens must understand how to use its qualities in such a way that they build upon its political traditions as they respond to the challenges of the day, bending to adapt to the current circumstances while still remaining true to its essential form.

From the earliest days of our democracy, participation has been a key to its success. It is true that not all could participate, even as ordinary citizens, in the beginning. The flexibility of the American democratic system is one of its key virtues, however, and this has opened the way to the system's self-improvement. Although full participation has not come without struggle or conflict, it has come, and through legitimate means embedded in our founding documents and expanded as time, needs, and new understanding came to pass. Differences of opinion and conflicts have often divided us, but framed within our fundamental political institutions and principles they have also led to reforms in American society representing advances in the causes of equality and justice. An awareness of the historical development of American society and its political institutions is crucial to a full appreciation of what has been achieved to this point and the direction of further progress.

Civics Standards Introduction

Democratic citizenship offers people the opportunity to engage in a unique kind of human activity. Political action allows people to dedicate their energy and passion to promoting justice and freedom in American society and around the world. Using citizenship fully can mean not only that people live according to society's decisions and laws, but that they themselves participate in creating those policies. Political freedom in a democracy is a matter of choosing the ideals for the society, as well as working to realize them.

The vitality of a democracy depends on people's making and maintaining a commitment to common goods and ideals. People willingly consent to support the political system through paying taxes, voting in elections, and fulfilling their civic responsibilities based on their recognition that other citizens will do likewise. This general support for our political institutions enhances everyone's rights and liberties, including freedom of religion and conscience, public safety, secure property, and the freedom to pursue a meaningful private life. Fulfilling our responsibilities as citizens creates the social conditions in which we can best pursue our own individual goals. Both the intrinsic value of direct participation and the resulting benefits of a lively and principled democracy are what make involvement in our democracy so important.

Democracies do not run themselves. Their political vitality depends on having knowledgeable, skilled, and dedicated people in every walk of life, not just in the government. Constitutions and the political institutions they establish are important, of course, but much of what makes constitutions and governments good or bad is how they enable citizens to use them for legitimate purposes. Everyone, whether he or she works for the government or not, must understand how and why the government has been organized the way it is and what alternative means are available in a democracy for solving various social and political problems.

Civic education should aim to develop competent, responsible citizens whose words and actions will uphold and enrich the constitutional democracy of the United States. Living as a good citizen requires informed thought and action and therefore depends on the citizen's possessing the proper knowledge, skills, and dispositions. Using standards that describe necessary knowledge and skills, educators can focus their lessons on what students need to learn in order to understand democracy and its relationship to a personal life as a good citizen.

Civics Standards Introduction

Though an understanding of government is certainly useful in helping people learn how to wisely exercise citizenship in the United States, "civics" is not just a shorthand way of saying "courses in American government." Civic education imparts an understanding of important relationships among citizens, associations, civil society, and government. History and the broader examination of American society and culture are important to understanding the variety and complexities of American institutions, practices, and aspirations. People have to understand what it takes to run for the school board, serve on a jury, and form an opinion about the wisdom of current U.S. trade policy. They must also understand how to identify a local public need and how to use community resources and institutions to address that need effectively. The various elements of good citizenship require a broad perspective on American public life.

If students meet the Standards for Excellence in Education (SEE) civics standards, they will understand the American democratic republic and how its guiding documents and institutions make it both strong and flexible. The lessons of civic education will teach students about the ideas from which our system of government developed, what politics is about, how government institutions operate, how students can participate, and why they should.

The fourteen content standards and the grade-level benchmarks in civics presented here are drawn from work organized by the Center for Civic Education, which was responsible for directing the development of the *National Standards for Civics and Government.* The first two standards represent the intellectual and participatory skills students should develop in order to become active, responsible citizens. The first standard identifies students' intellectual skills in terms of their ability to describe, analyze, and evaluate the subject matter. The second standard concerns students' ability to participate in the activities of responsible citizenship, which include monitoring political events, interacting with others to promote public understanding of the issues, and engaging in activities designed to influence the political process and its outcomes. These standards appear first, in keeping with the organization of all the standards in this volume; that is, the standards with a greater emphasis on skills come first, followed by those with a greater emphasis on knowledge.

Standards three through fourteen cover the civic knowledge students are expected to acquire. The twelve standards are grouped according to five categories, which are identified by questions that serve as the organizing

framework of the *National Standards for Civics and Government.* The five questions and the standards and benchmarks they cover are:

I. What are civic life, politics, and government?
The two standards here cover the purposes of government, how people may pursue common goals either with or without government involvement, and how to distinguish legitimate exercises of political power from its abuse.

II. What are the foundations of the American political system?
The two standards for this area focus on the constitutional principles that establish and limit government and that provide constitutional protections for the rights of individual citizens.

III. How does the government established by the Constitution embody the purposes, values, and principles of American democracy?
The three standards here set out the American system of dispersed powers, both among the branches of federal government and distributed among federal, state, and local governments and the people.

IV. What is the relationship of the United States to other nations and to world affairs?
The two standards in this category cover the United States and its international relationships and the role and purposes of U.S. foreign policy in world affairs.

V. What are the roles of the citizen in the American democracy?
The three standards in this category concern what citizenship is and the rights and responsibilities attached to it.

Some of the standards may be met through courses devoted specifically to civics and government, while others will be reached in related studies such as history, geography, or literature. Either way, it is important for educators to see that students are offered the opportunities to meet the entire set of standards, and not just fragments of it, by the time they complete their schooling. The distinctive ways in which American constitutional democracy divides and distributes powers make it especially important for its citizens to understand the whole picture of American government and civic responsibility.

Civics Standards Introduction

It should be noted that the formal curriculum may be used for students to learn the concept of citizenship that prevails in the United States. However, responsible citizenship depends on an individual's personal commitment to the fundamental values and principles that serve as the foundation of the American political system, and that commitment is not primarily acquired through the formal academic curriculum. Children develop their civic character through interactions with other children and adults not only in the classroom but at home and in the community. In the sense that all citizens are role models (good or bad) and create a political environment in which children live and learn about civic participation and responsibility, everyone is a civic educator.

The more detailed elaboration of the civic knowledge identified here is available in its original form in the *National Standards for Civics and Government*, produced by the Center for Civic Education. The center also used the contents of the *National Standards for Civics and Government* as the basis for creating a civics assessment framework for the National Assessment of Educational Progress. That framework has been used to construct the standards that specify the intellectual and participatory skills of civics education. Although the SEE standards are based on the *National Standards*, they should not be considered an abridged version.

The *National Standards for Civics and Government* can be obtained by writing to:

Center for Civic Education
5146 Douglas Fir Road
Calabasas, CA 91302-1467

or by accessing the center's website at www.civiced.org.

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1. Students will be able to exercise the intellectual skills needed to understand, analyze, and judge civic and political processes and events as informed, responsible citizens.

By the end of grade 4:

a. Identify major local, state, and national political figures, symbols, ideas, events, and institutions and describe what makes them important. A14.4d; H11.4bde; H12.4b; H13.4b; H17.4b; H27.4a; H30.4a; H31.4a

b. Explain in simple terms how political institutions operate and how they represent important ideas and principles, such as the protection of the individual and popular sovereignty. H11.4acd; H13.4a; H17.4ad; H24.4ab; H27.4b; H30.4ab; H31.4a

c. Distinguish two positions that could be taken with respect to an issue or problem, identify a reason for supporting each position, and judge which one is better. E2.4e; E5.4c; F1.8d

By the end of grade 8:

a. Describe and compare significant past and present political figures, government institutions, and historical events, identifying relevant likenesses and differences. H3.12ci

b. Explain the relationship between concepts and principles and actual government institutions, such as popular sovereignty and the electoral system, or the right of individual liberty and the judicial protections in the U.S. Constitution. G6.8d; G12.8c; H3.12e

c. Explain the causes of significant current and historical political events and issues.

d. Use reasons and evidence to support positions concerning major current and historical political events and controversies. E2.8b; E5.8d; H3.12bfj

By the end of grade 12:

a. Explain and analyze the strengths and weaknesses of various kinds of political institutions and processes in terms of the purposes they are designed to serve.

b. Analyze alternative interpretations of the origins and significance of current and historical events and controversies. F5.12a; G6.12e; G12.12b; H3.12bfj; H5.12d

c. Develop and justify a position concerning current or historical political actions and controversies using relevant evidence, reasons, and criteria for judging the merits of the possible alternatives. E2.12df; F1.12a; F3.12d; G5.12d; H5.12d; S5.12d; S6.12b

2. Students will be able to exercise the participatory skills needed to monitor political events, promote public understanding, and influence politics and governance.

By the end of grade 4:

a. Observe, read, and write about political events, activities, and figures using various media. E2.4b; F2.4e

b. Participate in the discussions of proposed classroom rules and policies with other students and teachers. E7.4ai; S28.2b

c. Carry out various civic and political actions, including voting in mock or student elections, writing letters and petitions, and taking part in community service projects.

By the end of grade 8:

a. Acquire and record relevant information and ideas about current and historical political events, ideas, and institutions using various media and research sources. E4.8d; F2.8cd

b. Design and carry out projects intended to inform and develop understanding of public issues for audiences of students and teachers, including interviews, written and oral reports, debates, and discussions. A14.8a; E4.8cd; E5.8c; E7.8cd

c. Identify, select, and carry out civic or political activities appropriate to a given purpose, including letters and petitions to elected officials, community service projects, and working for a local political campaign. E5.8e

By the end of grade 12:

a. Use various media and research sources to acquire and verify information about current and historical civic and political events, institutions, policy positions, and ideas. E2.12cf; F2.12ab

b. Design and carry out activities to increase understanding of public issues and policies for students and local public audiences, including interviews, debates, information campaigns, and panel discussions. E4.12af; F3.12d

c. Evaluate the advantages and disadvantages of alternative means of achieving specific political objectives, including political campaigns, lobbying, protest activities, community service projects, voluntary association initiatives, and government policies or actions.

3. Students will understand what civic life, politics, and government are and why they are important.

By the end of grade 4:

a. Describe government in terms of the people and groups who make, apply, and enforce rules and laws governing people's activity.

b. Explain why rules governing people's activity are necessary in the classroom, school, community, state, and nation.

c. Explain that the basic purposes of government in the United States are to protect the rights of individuals and to promote the common good.

d. Describe major governmental services provided to people and communities, including public services such as schools, roads, health services, and national security.

e. Explain that limited government differs from unlimited government by putting effective controls over those in power and that limited government serves to protect individual rights and liberty.

By the end of grade 8:

a. Explain what civic life, politics, and government are and evaluate what purposes government should serve.

b. Explain the difference between authority and power without authority, including the foundations of political authority, such as principle, custom, law, and the consent of the governed.

c. Evaluate, take, and defend positions on the necessity of government and the particular purposes that government should serve.

d. Explain how limited governments differ from unlimited governments in terms of the legal restraints placed on the exercise of power, and provide historical illustrations. H13.12b

e. Explain the importance of the rule of law for the protection of individual rights and the common good.

By the end of grade 12:

a. Explain the defining characteristics of civic life, politics, and government, including the nature of government's role in distributing benefits (such as social services) and burdens (such as taxation). G11.12a; H10.12a; H12.12b; H21.12c

b. Explain and evaluate competing ideas regarding the relationship between political and economic freedoms.

c. Evaluate, take, and defend positions on the necessity and purposes of politics and government.

d. Explain and evaluate the importance of civil society and the rule of law to limited government.

e. Explain how authoritarian and totalitarian governments exemplify unlimited government.

4. Students will understand the nature and purposes of constitutions and various forms of constitutional government.

By the end of grade 4:

a. Describe what the United States Constitution is and why it is important. S28.2b

By the end of grade 8:

a. Explain alternative uses of the term "constitution" and distinguish between a government with a constitution and a government that is truly constitutional, using historical and contemporary illustrations.

b. Describe the major characteristics of systems of shared powers and of parliamentary systems, including how they distribute, separate, and share political power.

c. Define and identify historical examples of confederal, federal, and unitary systems of government and discuss their advantages and disadvantages. H13.12ab

d. Identify examples of conditions that enable constitutional governments to flourish, including social and economic conditions and the roles of the citizenry and of public servants.

By the end of grade 12:

a. Explain different uses of the term "constitution" in relation to the establishment of government and describe how governments have exercised unlimited power despite having a constitution on paper.

b. Analyze the advantages and disadvantages of the various ways of distributing powers in systems of shared powers and in parliamentary systems.

c. Explain the various purposes served by constitutions and how constitutions have helped to preserve or protect the rights and welfare of individuals, groups, and the general public. H9.12a

d. Explain the advantages and disadvantages of federal, confederal, and unitary systems of government using criteria that include constitutional purposes, effectiveness, stability, and responsiveness to popular will.

e. Evaluate, take, and defend positions on what social, economic, and political conditions contribute to the establishment and preservation of constitutional governments.

f. Explain how different electoral systems reflect alternative concepts of representation, and distinguish representative systems from direct popular rule.

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5. Students will understand the values and principles underlying American constitutional democracy and government.

By the end of grade 4:

a. Describe values and principles fundamental to American democracy, including popular sovereignty, justice, and individual rights of life, liberty, and the pursuit of happiness. H11.4d

b. Identify ways people can work together to promote the values and principles of American democracy, including active citizenship, community service, and respect for others' rights.

By the end of grade 8:

a. Explain the essential ideas of American constitutional government reflected by the Declaration of Independence, the Constitution, and the Bill of Rights. H11.12b; H13.12ab

b. Explain and analyze the meaning and importance of the fundamental values and principles of American constitutional democracy expressed in significant historical documents, speeches, and events. H13.12ab

c. Identify and explain issues in which fundamental values and principles can be in conflict, including liberty versus equality, individual rights versus the common good, and community values versus freedom of expression.

d. Identify and explain historical and contemporary disparities between American ideals and realities, and describe efforts to fulfill those ideals.

GRADE 12

By the end of grade 12:

a. Explain and analyze the origins and historical development of the major ideas and principles that influenced and shaped the formation and structure of American constitutional government. H9.12a; H32.12f

b. Explain the origin and meaning of the ideas of liberal democracy and classical republicanism and how they are reflected in the values and principles of American constitutional democracy. H37.12a; H38.12b

c. Evaluate, take, and defend positions on the fundamental values and principles of American politics and their role in the preservation of constitutional democracy.

d. Evaluate, take, and defend rival positions on issues involving possible conflicts among fundamental values and principles, including the interdependence of fundamental values and rival interpretations about how a principle should be applied.

e. Evaluate, take, and defend rival positions about issues concerning historical and contemporary disparities between American ideals and realities, including the conditions of opportunity or discrimination based on race, gender, or socioeconomic class.

6. Students will understand the diversity and shared ideals of American society and political culture.

By the end of grade 4:

a. Identify Americans' commonly held beliefs about themselves and their government, including individual liberty, the common good, equality, fairness, respect for law, education, the work ethic, and voluntarism.

b. Describe the diversity of the United States and identify some of the benefits and costs of this diversity. H20.4a

c. Identify and explain how conflicts arising from social diversity can be prevented or resolved through practicing basic American values in school, civic life, or political action. H20.4a

By the end of grade 8:

a. Explain how American society is shaped and unified by shared political values and principles. H11.4a; H13.4b

b. Identify and explain important geographic, social, and economic factors, as well as ideas and people, that have played a significant historical part in shaping American society. G11.8c

c. Identify and explain factors that have inclined Americans toward voluntarism and describe how various institutions support volunteer activities.

d. Evaluate, take, and defend positions on the values and challenges of diversity in American life, using historical and contemporary examples. H30.12bcde; H31.12e

e. Describe the history of American political conflict and identify factors that have limited or failed to limit the level of violence in political conflicts. G12.8bc

GRADE 12

By the end of grade 12:

a. Explain the importance of shared political and civic beliefs and values to the preservation of constitutional democracy in an increasingly diverse American society.

b. Explain how the distinctive qualities of American social and political culture have been influenced by various important historical factors, including relative security from foreign threats, religious toleration, the availability of land and resources, the history of slavery and immigration, and geographic and social mobility. G12.12d

c. Evaluate, take, and defend positions on the importance and influence of voluntarism and organized groups in American society and their relationship to the functions of government.

d. Evaluate, take, and defend positions regarding the effects of social diversity on the vitality of American society. H20.12ab; H30.12bcde

e. Evaluate, take, and defend positions on the history of American political conflict and its effects, including the impact on national unity. G12.12abd

7. Students will understand how the United States Constitution allocates power and responsibility in the government.

By the end of grade 4:

a. Describe the United States Constitution as a written document that sets out the powers, organization, and purposes of the government. H13.4a

b. Explain the purposes and importance of rules and laws in the classroom, school, community, state, and nation.

c. Identify and describe criteria used to evaluate rules and laws, including fairness, practicality, and ease of understanding.

By the end of grade 8:

a. Explain how the powers of the three branches of the national government are distributed, shared, and checked by the separation of powers.

b. Explain how and why in the federal system some powers are assigned to the national government, some powers are assigned to the state governments and the people, and some powers are shared between the national and state governments, reflecting the balance of powers. H12.12a

c. Identify the importance of law and its principal varieties, namely, constitutional, criminal, and civil law.

d. Explain and apply criteria useful in evaluating rules and laws, including fairness, practicality, and ease of understanding.

e. Explain the importance of due process and the adversary system in the judicial protection of individual rights.

GRADE 12

By the end of grade 12:

a. Explain how the United States Constitution grants and distributes power to national and state government and how it seeks to prevent the abuse of power. H13.12a

b. Evaluate, take, and defend positions on issues regarding the Constitution's distribution of powers and responsibilities within the federal system, with particular emphasis on historical conflicts over the roles of national government, state government, particular groups and interests, and the people. H13.12c

c. Evaluate, take, and defend positions on the role and importance of law in the American political system, using historical and contemporary examples.

d. Evaluate, take, and defend rival positions on current issues regarding the judicial protection of individual rights, using historical and contemporary examples. H30.12e; H13.12c

8. Students will understand the organization and activities of national, state, and local government.

By the end of grade 4:

a. Give examples of how the three branches of the national government protect individual rights and promote the common good.

b. Explain the most important responsibilities of state and local government, including education, health services, transportation, law enforcement, and public safety.

c. Identify their Congressional representatives, the President, their local representatives, and the heads of the executive branches of their state and local governments.

By the end of grade 8:

a. Describe the major responsibilities of the national government for domestic and foreign policy, using historical and contemporary examples.

b. Explain why states have constitutions, their purposes, and the relationship of state constitutions to the federal constitution.

c. Identify the government's sources of revenue, the constitutional authorization to tax, and the purposes for which government revenues are used.

d. Explain the organization and major responsibilities of state and local governments and citizens' access to those governments. G10.8f

By the end of grade 12:

a. Evaluate, take, and defend rival positions on issues regarding the major responsibilities of the national government for domestic and foreign policy.

b. Evaluate, take, and defend rival positions on issues regarding the proper relationships among the national government, state government, and local government.

c. Evaluate, take, and defend positions on the demand for government services and how the government raises revenues to fund them. S8.12g

d. Evaluate, take, and defend positions on issues regarding state and local governments and citizens' ability to monitor and influence their policies.

e. Describe major policy views held by Congressional representatives, the President, representatives in state and local legislative branches, and the heads of the executive branches of local and state governments.

9. Students will understand how the American political system provides for choice and opportunities for participation.

GRADE 4

By the end of grade 4:

a. Identify and describe the means by which citizens can monitor and influence the actions of their government. E2.4aef; E7.4j

GRADE 8

By the end of grade 8:

a. Explain what is meant by the public agenda, how it is set, and the kinds of issues that are on it.

b. Evaluate, take, and defend positions on the influence of the media on American political life and on issues related to freedom of the press. E7.8i

c. Explain how political parties, campaigns, and elections provide opportunities for citizens to participate in the political process.

d. Explain how interest groups, unions, and professional organizations provide opportunities for citizens to participate in the political process.

e. Explain how public policy is formed and carried out at local, state, and national levels and what roles individuals can play in the process.

GRADE 12

By the end of grade 12:

a. Evaluate, take, and defend positions about how the public agenda is set and shaped by political leaders, political institutions, political parties, interest groups, the media, and individual citizens. E7.12a; S30.12b

b. Evaluate, take, and defend positions about the role of public opinion in American politics.

c. Evaluate, take, and defend positions on how the media have been used to communicate and shape ideas in American political life.

d. Evaluate, take, and defend positions about the roles of political parties, campaigns, and elections in American politics.

e. Evaluate, take, and defend positions about the roles of interest groups, voluntary associations, and other groups in American politics and the consequences of conflict among those groups in the promotion and implementation of public policy.

10. Students will understand the relationship of the United States to the other nations and international organizations in the world and the ways they interact.

By the end of grade 4:

a. Explain that the world is divided into different nations, among which is the United States. G12.4a

b. Explain the major ways nations interact with one another, including trade, diplomacy, cultural contacts, treaties, and uses of military force. G12.4bc

By the end of grade 8:

a. Identify the world's nation-states on a map and explain the role of major international organizations and economic forces in international affairs, including the United Nations, NATO, Amnesty International, and the World Trade Organization. G6.8d; H58.12d

b. Explain the reasons for and consequences of the breakdown of order within, and war among, nation-states. G6.8d; G12.8b; H59.12abc

c. Describe the impact of economic, social, and political developments in other countries, as well as their demographic trends and environmental conditions, on the United States. G6.8d; G12.8b

By the end of grade 12:

a. Compare and contrast the political systems and alliances of other countries. H32.12h

b. Evaluate, take, and defend positions about the effects of significant international political, economic, technological, demographic, environmental, and cultural developments on the United States and other nations. F1.12ac; G12.12ac; H59.12abde

c. Evaluate, take, and defend positions about the purposes and functions of international organizations. F1.12c; G12.12e; H58.12d

11. Students will understand how the United States influences other nations.

By the end of grade 4:

a. Give examples of various ways in which the United States has carried out its foreign policies, including foreign aid, trade relations, and the use of the military.

By the end of grade 8:

a. Describe the origins of the important political ideas reflected by the American Revolution, the U.S. Constitution, and the Declaration of Independence and how these ideas have influenced other nations. H13.4a

b. Explain how United States foreign policy has been made and the means by which it has been carried out.

By the end of grade 12:

a. Evaluate, take, and defend positions about the impact of political ideas expressed in the U.S. Constitution and the Declaration of Independence on nations and their politics.

b. Evaluate, take, and defend rival positions on the principal stances and significant issues of United States foreign policy in light of American national interests, values, and principles. H31.12b

c. Evaluate, take, and defend positions about how United States foreign policy is made and the means by which it is carried out. H30.12a; H31.12b

d. Evaluate, take, and defend positions about the United States' relationship to international organizations and international political and economic forces.

12. Students will understand citizenship and its rights and responsibilities.

By the end of grade 4:

a. Explain what citizenship means in terms of membership in and allegiance to the United States and the process by which people become citizens.

b. Explain why personal and political rights are important to the individual and to a democratic society and identify issues involving these rights, including conscience and free political speech.

c. Explain why the fulfillment of responsibilities is important to individuals and their families, community, state, and nation, including family support, obeying laws, and jury service. S22.2c

By the end of grade 8:

a. Explain the meaning of citizenship in terms of its legal and political status and the criteria used to grant naturalized citizenship, including residence requirements, proof of moral character, and required knowledge and skills.

b. Identify, define, and explain the significance of important personal, economic, and political rights (such as freedom of religion, the right to private property, and the right to vote and assemble) and identify their major documentary sources.

c. Take and defend a position on issues regarding the proper scope and limits of rights and the criteria used to set those limits, including compelling national interests, public safety, and the rights of others. H31.12f; S28.8c

d. Identify and explain the importance of personal and civic responsibilities to the individual and society and distinguish between the two kinds of responsibilities.

By the end of grade 12:

a. Explain the meaning of citizenship and evaluate, take, and defend positions on issues regarding the criteria used for naturalization.

b. Evaluate, take, and defend rival positions on issues and conflicts of personal, economic, and political rights, using commonly cited criteria for setting priorities among conflicting rights, such as public safety, compelling government interest, and others' rights. F3.12e; H31.12f

c. Evaluate, take, and defend positions on issues regarding the personal and civic responsibilities of American citizens.

13. Students will understand the civic dispositions or traits of private and public character that are important to the preservation and improvement of American constitutional democracy.

By the end of grade 4:

a. Identify and explain the importance to American democratic government of citizens' possessing certain dispositions, including respect, honesty, open-mindedness, and patriotism.

By the end of grade 8:

a. Explain how qualities of private character, such as responsibility, self-discipline, fairness, and respect for human dignity, contribute to individuals' and society's well-being. F9.8d; S25.5c

b. Explain how qualities of public character such as civility, respect for law, and a spirit of independence contribute to the vitality of American democracy. F9.8d; S25.5c

By the end of grade 12:

a. Evaluate, take, and defend positions on the importance to American constitutional democracy of dispositions (such as self-discipline, self-governance, and individual responsibility) that lead individuals to act as independent members of American society. F9.12c

b. Explain how dispositions such as respect for the rights and choices of individuals and compassion for others contribute to positive relationships in communities and civic life. F9.12c

c. Evaluate, take, and defend positions on the importance of civic-mindedness and patriotism to American constitutional democracy.

d. Evaluate, take, and defend positions on dispositions that promote thoughtful and effective participation in public affairs.

14. Students will understand how citizens participate in civic life and politics.

By the end of grade 4:

a. Describe the means (including participation in political parties and interest groups, voting, and political demonstrations) by which citizens can influence the decisions and actions of their government.

b. Explain the importance of leadership and service in the school, community, state, and nation and the qualities leaders need to meet their responsibilities.

By the end of grade 8:

a. Explain how social and political participation in civic and political life may lead to the attainment of individual and public goals, through either individual or organized group efforts.

b. Describe how Americans can monitor and influence politics and government, including voting, supporting political campaigns, and participating in political movements.

c. Explain the importance of political leadership and public service in a constitutional democracy and the qualities needed to fulfill these responsibilities.

d. Explain how citizens' possession of civic knowledge and skills affects their ability to participate in public affairs. S25.5a

By the end of grade 12:

a. Evaluate, take, and defend positions on various forms of organized political and social action and their relationship to the attainment of individual and public goals.

b. Evaluate, take, and defend positions about the various means that citizens can use to monitor and influence the formation and implementation of public policy, including voting, joining political parties, campaigning for political candidates, and participating in political movements, demonstrations, and civil disobedience.

c. Evaluate, take, and defend positions about the functions, challenges, and responsibilities of leaders and public servants in American constitutional democracy.

d. Analyze the ways in which the extent and kind of citizens' knowledge and skills in public affairs and the values and principles of American constitutional democracy shape the various ways in which they may participate in American democracy.

English Language Arts Standards

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English Language Arts Standards Introduction

Asking why the learning of language is important already begins to provide an answer: Language allows us to give and receive ideas and information, and this ability profoundly shapes our lives in the world. Our ability to express ourselves enables us to carry out all kinds of personal and professional activities. Facility with written, spoken, and visual language strengthens the ability to learn, to cooperate with others, and to understand and evaluate the growing wealth of human ideas. It can even open doors to wisdom. Although children have amazing capacities for acquiring language, it takes time, practice, and guidance for them to develop linguistic skills to a level demanded by modern society. Speaking, reading, and even writing may seem natural to us once we have achieved some proficiency, but even at the most basic level there are key elements to be mastered, and further learning involves greater complexity. Getting a clear message across to an audience, understanding the precise meaning of a written statement or direction, and writing effectively and expressively require careful attention, effort, and imagination. Grammar, spelling, and the formal conventions of writing provide the essential building blocks, but these must be used skillfully in order to craft out of words constructions that are useful and appealing.

Students can make use of their language skills during their schooling as well as afterward. Across the curriculum, from mathematics to music, language serves an essential function in each and every one of the liberal arts disciplines. Written and spoken words play a large part in our ordinary work lives, and they entertain us in all sorts of ways, through pleasure reading, radio, television, movies, and theatre. Everyday life constantly calls for the use of language, whether we are reading a newspaper, ordering lunch and talking over it, or filling out a form for a driver's license and complaining about the length of the line. Through language people share their most personal feelings. Words give us the concepts through which we understand our own identities, ideals, and places in the world. And language provides a medium for the creation of literary works of art, which enhance our understanding of the world and human life and offer us a means by which to create something beautiful that others might appreciate.

The teaching and learning of English language arts should be mindful of both the practical and the artistic. Everyone needs to acquire the skills to communicate with others, hold a job, and get things done. At the same time, everyone also benefits if he or she can cultivate an appreciation for the beauty of language and the human truths represented in literature.

English Language Arts Standards Introduction

The answer to the question "Why study literature?" is hotly contested these days, with the question "What is literature?" running a close second. The purpose of the formal study of literature is to increase our understanding of ourselves and others in the world. Literature offers the opportunity to do this because it consists of the written expression of human imagination in its efforts to define, reflect upon, and redefine human experience. Both as individuals and as members of particular societies and cultures, literary authors strive to tell us something about who they are and what gives life meaning. They challenge us to look at the world as they do and set their visions beside our own experience. In the interplay between text and reader, we enrich our understanding of ourselves and of people who see the world quite differently.

Literature offers a wealth of ideas, and ways of illuminating them, that dwarf anything any individual could imagine. Many great works of both classical and contemporary literature are responses to or revisions of stories and ideas that have come before them. As readers and prospective authors, people learn from good literature some of the various ways of expressing ideas in traditional and innovative fashions. Good literature offers enduring or fresh uses of language and explorations of questions and ideas. By introducing such literature to their students, teachers expose them to exemplary models of human creativity and reflection. Familiarity with American literature provides the student with an understanding of the American heritage itself and how writers such as Jefferson and Whitman have shaped the American experience. British literature also deserves to be studied, both because of its own contributions and as the primary influence upon American writing. At the same time, students should develop a familiarity with literature throughout human civilization, in order to understand the richness and variety of literary ideas and imagination.

The following English language arts standards represent the form of student accomplishment recommended in this subject area. The nature of the English language arts is such that the standards place a heavy emphasis on skills, because reading, writing, and other communication skills are so central. As with the other subjects, skill and content knowledge cannot be learned or taught entirely in isolation from each other, and so the standards also reflect knowledge of the content of the English language arts that is considered essential.

English Language Arts Standards Introduction

The standards represented here are excerpted from the California English Language Arts Content Standards. The reading list was developed as part of the Massachusetts' English Language Arts Curriculum Framework. At this time there are no widely accepted national voluntary standards for English language arts.

Our work with standards writing teams has informed our choice of these two documents. Teachers, administrators, community members, and parents with whom we have worked have found them to be particularly helpful guides. In addition, California's standards and Massachusetts' reading list have been widely sanctioned by public review and external vetting. However, as with all the other standards presented in *Standards for Excellence in Education*, these should not be simply adopted as they are written. They are offered as a model to aid the development or examination of state or local standards.

The California standards are written for each grade and include multiple, specific, and clear standards that can inform curriculum almost directly. The standards are divided into four strands: reading, writing, written and oral English language conventions, and listening and speaking. For consistency with the other standards in this book, these standards have been renumbered and modestly reformatted from the original.

We encourage interested readers to examine the complete state documents, which can be found on the Internet at http://www.cde.ca.gov and http://info.doe.mass.edu or ordered directly from the states. The number for the California State Board of Education is 916-657-5478; ask for the California Language Arts Content Standards. The Massachusetts Department of Education can be reached at 781-388-3396; ask for the English Language Arts Curriculum Framework.

1. Students will understand the basic features of a reading. They select and know how to translate letter patterns into spoken language using phonics, syllabication, and word parts. They apply this knowledge to achieve fluent oral and silent reading.

By the end of grade 4:

a. Read narrative and expository text aloud with grade-appropriate fluency and accuracy and with appropriate pacing, intonation, and expression.

b. Apply knowledge of word origins, derivations, synonyms, antonyms, and idioms to determine the meaning of words and phrases. F8.4ac

c. Use knowledge of root words to determine the meaning of unknown words within a passage. F8.4ab

d. Know common Greek- and Latin-derived roots and affixes and use this knowledge to analyze the meaning of complex words (e.g. international). F8.4ab

e. Use a thesaurus to determine related words and concepts.

1. Students will use their knowledge of word origins and word relationships, as well as historical and literary context clues, both to determine the meaning of specialized vocabulary and to understand the precise meaning of grade-level-appropriate words.

By the end of grade 8:

a. Use idioms, analogies, metaphors, and similes to infer the literal and figurative meanings of phrases. F8.8b

b. Understand the most important points in the history of the English language and use common word origins to determine the historical influences on English word meanings. F8.8b

c. Use word meanings within the appropriate context and be able to verify those meanings by definition, restatement, example, comparison, or contrast.

READING

1. Students will apply their knowledge of word origins both to determine the meaning of new words encountered in reading materials and to use those words accurately.

GRADE 12

By the end of grade 12:

a. Trace the etymology of significant terms used in political science and history. F8.12a

b. Apply knowledge of Greek, Latin, and Anglo-Saxon roots and affixes to draw inferences concerning the meaning of scientific and mathematical terminology. M10.12a

c. Discern the meaning and relationship between pairs of words encountered in analogical statements (e.g., synonyms and antonyms, connotation and denotation).

2. Students will read and understand grade-level-appropriate material. They draw upon a variety of comprehension strategies as needed, including generating and responding to essential questions, making predictions, and comparing information from several sources.

By the end of grade 4:

a. Identify structural patterns found in informational text (e.g., compare and contrast, cause and effect, sequential-chronological order, proposition and support) to strengthen comprehension. C9.4a; H1.12d

b. Use appropriate strategies when reading for different purposes (e.g., full comprehension, locating information, and personal enjoyment). C2.4a; H2.12a; M10.3a

c. Make and confirm predictions about text by using prior knowledge and ideas presented in text itself, including illustrations, titles, topic sentences, key words, and foreshadowing clues.

d. Evaluate new information and hypotheses by testing them against known information and ideas. H3.12j

e. Compare and contrast information on the same topic after reading several passages or articles. C1.4c; C9.4a; H3.12f

f. Distinguish between cause and effect and fact and opinion in expository text. C9.4a; H2.12a; H3.12a; S6.8b

g. Follow multiple-step instructions from a basic technical manual (e.g., how to use computer commands or video games).

2. Students will read and understand grade-level-appropriate material. They describe and connect the essential ideas, arguments, and perspectives of text, and they relate text structure, organization, and purpose.

By the end of grade 8:

a. Compare and contrast the features and elements of consumer materials to gain meaning from documents (e.g., warranties, contracts, product information, and instructional manuals).

b. Analyze text which uses proposition-and-support patterns. C1.8c; G14.8b; M9.12b; M10.8c

c. Find similarities and differences among texts in the treatment, scope, or organization of ideas. G14.8b; H3.12f

d. Compare original text to a summary for accuracy of the main ideas, inclusion of critical details, and the extent to which it conveys the underlying meaning of the original text.

e. Understand and explain the use of a complex mechanical device by following technical directions.

f. Use information from a variety of consumer, workplace, and public documents to explain a situation or decision and/or to solve a problem.

g. Evaluate the unity, coherence, logic, internal consistency, and structural patterns of text. M9.12b

2. Students will read and understand grade-level-appropriate material. They analyze the organization patterns, arguments, and positions advanced.

By the end of grade 12:

a. Analyze both the features and rhetorical devices of different types of public documents (e.g., policy statements, speeches, debates, platforms) and how authors use these features and devices.

b. Analyze how clarity is affected by the patterns of organization, hierarchical structures, repetition of key ideas, syntax, and word choice in text.

c. Verify and clarify facts presented in other types of expository texts by using a variety of consumer, workplace, and public documents. C2.12a; F1.12b; H2.12f; H3.12ag; M10.12a

d. Make warranted and reasonable assertions about significant patterns, motifs, and perspectives by using elements of text to defend and clarify interpretations.

e. Analyze an author's implicit and explicit philosophical assumptions and beliefs about a subject. F1.12b; H3.12hk; M9.12b

f. Critique the power, validity, and truthfulness in the logic of arguments set forth in public documents, their appeal to audiences both friendly and hostile, and the extent to which they anticipate and address reader concerns and counterclaims (e.g., appeal to reason, appeal to authority, appeal to pathos/emotion). C1.12c; C2.12a; H3.12f; M9.12b; S6.8b

3. Students will read and respond to a wide variety of significant works of children's literature. They distinguish between the structural features of text and the literary terms or elements (i.e., theme, plot, setting, and characters).

By the end of grade 4:

a. Describe the structural difference of various imaginative forms of literature, including fantasies, fables, myths, legends, and fairy tales. F2.4a; f5.4b; H7.4b; H8.4a; H9.4c; H12.4a; H32.4a

b. Identify the main events of the plot, their causes, and how each influences future action(s). F2.4d

c. Use knowledge of the situation and setting and of a character's traits and motivations to determine the causes for that character's actions. A11.4b

d. Compare and contrast tales from different cultures by tracing the exploits of one character type and develop theories to account for similar tales in diverse cultures (e.g., trickster tales). F2.4ad; F5.4bd; H3.12c; H6.4a; H9.4c; S28.5b

e. Identify and define the presence of figurative language in literary works, including simile, metaphor, hyperbole, and personification.

3. Students will read and respond to historically or culturally significant works of world literature, particularly American and British literature. They clarify the ideas and connect them to other literary works.

By the end of grade 8:

a. Determine and articulate the relationship among the purposes and characteristics of different forms of poetry (e.g., ballad, lyric, couplet, epic, elegy, ode, and sonnet).

b. Evaluate the structural elements of the plot (e.g., subplots, parallel episodes, climax), the plot's development, and how (and whether) conflicts are (or are not) addressed and resolved. A10.8a; F2.8d; F2.12c; F3.8c

c. Compare and contrast motivations and reactions of literary characters from different historical eras confronting similar situations or conflicts. A10.8c; A11.4b; A11.12a; A13.8b; H2.12e; H3.12ci; S28.8c

d. Analyze relevance of setting (place, time, and customs) to the mood, tone, and meaning of text. A10.8c; A13.8b

e. Identify and analyze recurring comparative themes (e.g., good and evil, traditional and contemporary) across works.

f. Identify significant literary devices that define a writer's style (e.g., metaphor, symbolism, dialect, and irony) and use those elements to interpret the work.

g. Analyze how a work of literature reflects the heritage, traditions, attitudes, and beliefs of its author (biographical approach). F5.8ac; F9.8e; H3.12k; S28.8b

3. Students will read and respond to historically or culturally significant works of world literature, particularly American and British literature. They conduct in-depth analyses of recurrent patterns and themes.

By the end of grade 12:

a. Analyze characteristics of sub-genres (e.g., satire, parody, allegory, pastoral) that are used in poetry, prose, drama, novel, short story, essay, and other basic genres. A10.12b; A11.12a

b. Analyze how the theme or meaning of a selection represents a view or comment on life, using textual evidence to support the claims. F1.12b

c. Analyze how irony, tone, mood, style, and "sound" of language are used to achieve specific rhetorical and aesthetic purposes. F1.12b

d. Analyze ways in which poets use imagery, personification, figures of speech, and sounds to evoke readers' emotions. F1.12b

e. Analyze recognized works of American literature representing a variety of genres and traditions in order to:

(1) Trace the development of American literature from the Colonial period forward.

(2) Contrast the major periods, themes, styles, and trends, and describe how works by members of different cultures relate to one another in each period.

(3) Evaluate the philosophical, political, religious, ethical, and/or social influences that shaped characters, plots, and settings. A10.12b; H2.12e; H3.12cik; S28.12d

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f. Analyze how authors over the centuries have used archetypes drawn from myth and tradition in literature, film, political speeches, and religious writings (e.g., how the archetypes of banishment from an ideal world may be used to interpret Shakespeare's tragedy *Macbeth*). F1.12b

g. Analyze recognized works of world literature from a variety of authors in order to:

(1) Contrast the major literary forms and techniques and the characteristics of the major literary periods (e.g., Homeric Greece, Medieval Period, Romantic, Neoclassic, Modern).

(2) Relate literary works and authors to major themes and issues of their eras.

(3) Evaluate the philosophical, political, religious, ethical, and/or social influences that shaped characters, plots, and settings. A10.12b; A13.12b; F1.12b; F2.12de; F5.12bc; F9.12d; H2.12e; H3.12cik

h. Analyze the political assumptions in a selection of literary works or essays on a topic (e.g., suffrage, women's place in organized labor) for their clarity and consistency (political approach). F1.12b; H2.12e

i. Analyze the philosophical arguments presented in literary works to determine whether the author's position has contributed to the quality of each work and the credibility of its characters (philosophical approach). F1.12b

WRITING

4. Students will write clear and coherent sentences and paragraphs that develop a central idea. Their writing considers audience and purpose. They successfully use the stages of the writing process (prewriting, drafting, revising, and editing successive versions).

By the end of grade 4:

a. Select a focus, organization, and point of view based upon purpose, audience, length, and format requirements. M10.3ab; M10.5ac

b. Create a multiple-paragraph composition that provides an introductory paragraph; establishes and supports a central idea with a topic sentence at or near the beginning of the first paragraph; includes supporting paragraphs with simple facts, details, and explanations; concludes with a paragraph that summarizes the points; and is indented properly. M10.3a; M10.5c

c. Use traditional structures for conveying information (e.g., chronological order, cause and effect, similarity and difference, and posing and answering a question). M10.3ab; M10.5ac

d. Write fluidly and legibly in cursive or joined italic, easily transcribing manuscript into cursive and vice versa.

e. Quote or paraphrase information sources, citing them appropriately. S6.5a

f. Locate information in reference texts by using organizational features (e.g., prefaces and appendices). G2.4e; H4.12d; S6.5a

g. Use various reference materials (e.g., dictionary, thesaurus, card catalog, encyclopedia, on-line information) as an aid to writing. G2.4e; H4.12d; S6.5a

h. Understand the structure and organization of (and use) almanacs, newspapers, and periodicals. G2.4e; H4.12d; S6.5a

i. Demonstrate basic keyboarding skills and familiarity with the vocabulary of technology (e.g., cursor, software, memory, disk drive, hard drive).

j. Edit and revise selected drafts to improve coherence and progression by adding, deleting, consolidating, and rearranging text.

4. Students will write clear, coherent, and focused essays. Writing exhibits awareness of audience and purpose. Essays contain formal introductions, bodies of supporting evidence, and conclusions. Students successfully use the stages of the writing process, as needed.

By the end of grade 8:

a. Create compositions that establish a controlling impression, have a coherent thesis, and/or make a clear and well-supported conclusion.

b. Establish coherence within and among paragraphs through effective transitions, parallel structures, and similar writing techniques.

c. Support theses or conclusions with analogies, paraphrases, quotations and opinions from authorities, comparisons, and similar devices. C2.8b

d. Plan and conduct multiple-step information searches using computer networks and modem-delivered services. C2.8b; S5.8d

e. Achieve effective balance between research information and original ideas.

f. Revise writing for word choice, appropriate organization, consistent point of view, and transitions among paragraphs, passages, and ideas.

4. Students will write coherent and focused texts that convey a well-defined perspective and tightly reasoned argument. Student writing demonstrates awareness of audience and purpose and use of the stages of the writing process, as needed.

By the end of grade 12:

a. Demonstrate understanding of the elements of discourse (e.g., purpose, speaker, audience, form) when completing narrative, expository, persuasive, informational, or descriptive writing assignments. C2.12b; M10.12a

b. Use point of view, characterization, style (e.g., irony), and related elements for specific rhetorical and aesthetic purposes.

c. Structure ideas and arguments in a sustained, persuasive, and sophisticated way and support them with precise and relevant examples. F3.12de; H4.12f; M9.12a; M10.12a

d. Enhance meaning by employing rhetorical devices, including the extended use of parallelism, repetition, and analogy; the incorporation of visual aids (e.g., graphs, table, pictures); and the issuance of a call for action. H2.12d; M10.12a

e. Use language in natural, fresh, and vivid ways to create a specific tone. A10.12a

f. Develop presentations by using clear research questions and creative and critical research strategies (e.g., field studies, oral histories, interviews, experiments, electronic sources). C2.12b; G1.12a; H4.12a; M10.12a

g. Use systematic strategies (e.g., anecdotal scripting, annotated bibliographies) to organize and record information. H4.12c

h. Revise writing to highlight individual voice, improve the style and sentence variety, and enhance subtlety of meaning and tone in ways that are consistent with purpose, audience, and genre. A10.12a

5. Students will write compositions that describe and explain familiar objects, events, and experiences. Student writing demonstrates a command of standard English and the drafting, research, and organizational strategies outlined in Standard 4.

By the end of grade 4:

a. Write narratives on incidents that relate ideas, observations, or memories; provide a context to enable the reader to imagine the world of the event or experience; use concrete sensory details; and provide insight into why this incident is memorable.

b. Write responses to literature that demonstrate an understanding of the literary work and that support judgments through references both to the text and to prior knowledge.

c. Write information reports that frame a key question about an issue or situation; include facts and details for focus; and draw from more than one source of information (e.g., speakers, books, newspapers, media sources). C1.4c; G5.4b

d. Write summaries that contain the main ideas of the reading selection and the most significant details. F2.4de; H2.12ab

5. Students will write narrative, expository, persuasive, and descriptive text of at least 500 to 700 words. Student writing demonstrates a command of standard English and the research, organizational, and drafting strategies outlined in Standard 4.

By the end of grade 8:

a. Write biographies, autobiographies, short stories, and/or narratives that relate a clear, coherent incident, event, or situation by using well-chosen details; reveal the significance of, or the writer's attitude about, the subject; and employ narrative and descriptive strategies (e.g., relevant dialogue, specific action, physical description, background description, comparison or contrast of characters). A10.8b; F3.8b

b. Write responses to literature that develop interpretations that exhibit careful reading and insight; connect the student's own responses to the writer's techniques and to specific textual references; draw supported inferences about the effects of a literary work on its audience; and support judgments through references to the text, other works, other authors, or to personal knowledge.

c. Write research reports that define a thesis; record important ideas, concepts, and direct quotations from significant information sources, paraphrasing and summarizing all perspectives on the topic, as appropriate; use a variety of primary and secondary sources, distinguishing the nature and value of each; and organize and record information on charts, maps, and graphs. C2.8b; G14.8b; H2.12d; H3.12g; S5.12a

d. Write persuasive compositions that include well-defined theses that make clear and knowledgeable judgments; support arguments with detailed evidence, examples, and reasoning, differentiating between evidence and opinion; and arrange details, reasons, and examples, effectively anticipating and answering reader concerns and counterarguments. C1.8c; M10.12b

e. Write documents related to career development, including simple business letters and job applications, that are purposeful and reflect the intended audience; meet the needs of the audience efficiently; and follow the conventional style for the type of document (e.g., letter of inquiry, memorandum). C2.8c

f. Write technical documents that explain a complex operation or situation (e.g., system design, tool operation, or bylaws of an organization); identify the sequence of activities needed to create the product, service, or system; include all the factors and variables that need to be considered; and use formatting techniques (e.g., headings, differing fonts) to aid comprehension. S5.8a

5. Students will combine the rhetorical strategies of narration, exposition, persuasion, and description to produce text of at least 1,500 words, when appropriate. Student writing demonstrates a command of standard English and the research, organizational, and drafting strategies outlined in Standard 4.

GRADE 12

By the end of grade 12:

a. Write fictional, autobiographical, and biographical narratives that narrate a sequence of events and communicate their significance to the audience; locate scenes and incidents in specific places; develop the narrative elements with concrete sensory details and language (e.g., visual details of scenes; descriptions of sounds, smells, specific actions; movements and gestures; interior monologue or feelings of characters); pace the presentation of actions to accommodate temporal, spatial, and dramatic mood changes; and make effective use of descriptions of appearance, images, shifting perspectives, and sensory details. A10.12a; A13.12b

b. Write responses to literature that demonstrate a comprehensive understanding of the significant ideas in works or passages; analyze the use of imagery, language, universal themes, and unique aspects of text; support key ideas and viewpoints through accurate and detailed references to the text and to other works; demonstrate an understanding of the author's use of stylistic devices and an appreciation for the effects created; and identify and assess the impact of perceived ambiguities, nuances, and complexities within text.

c. Write reflective compositions that explore the significance of personal experiences, events, conditions, or concerns using rhetorical strategies (e.g., narration, description, exposition); draw comparisons between specific incidents and broader themes that illustrated the writer's important beliefs or generalizations about life; and maintain a balance in describing individual incidents and relating those incidents to more general and abstract ideas.

d. Write historical investigation reports that use exposition, narration, description, argumentation, exposition, or some combination of rhetorical strategies to support the main proposition; analyze several historical records of a single event, examining critical relationships among elements of the research topic; explain the perceived reasons for the similarities and differences in historical records with information derived from primary and secondary sources to support or enhance the presentation; include information from all relevant perspectives, taking the validity and reliability of sources into consideration; and provide a formal bibliography. C1.12c; H2.12bcd; H3.12bfghk; H4.12abdf

e. Write clear and purposeful job applications and resumes that address the intended audience appropriately; use varied levels, patterns, and types of language to achieve intended effects and aid comprehension; modify tone to fit purpose and audience; and follow the conventional style for the type of document (e.g., resume, memorandum) and use page formats, fonts, and spacing that contribute to the documents' readability and impact.

f. Deliver multimedia presentations that combine text, images, and sound, drawing information from many sources (e.g., television broadcasts, videos, films, newspapers, magazines, CD-ROMs, Internet, computer-media-generated images); select an appropriate medium for each element of the presentation; use selected media skillfully, including proper editing and monitoring for quality; and test audience response and revise the presentation accordingly. A10.12b; A12.8ab; A12.12ab; A13.12ac

WRITTEN AND ORAL ENGLISH LANGUAGE CONVENTIONS

6. Students will write and speak with a command of standard English conventions that is appropriate to each grade level.

By the end of grade 4:

a. Use simple and compound sentences in writing and speaking.

b. Combine short, related sentences with appositives, participle phrases, adjectives, adverbs, and prepositional phrases.

c. Identify and use regular and irregular verbs, adverbs, prepositions, and coordinating conjunctions in writing and speaking.

d. Use commas in direct quotations, apostrophes in possessives and contractions, and parentheses.

e. Use underlining, quotations, or italics to identify titles.

f. Capitalize names of magazines, newspapers, works of art, musical compositions, names of organizations, and the first word in quotations.

g. Spell correctly roots, inflections, suffixes and prefixes, and syllable constructions.

6. Students will write and speak with a command of standard English conventions that is appropriate to each grade level.

By the end of grade 8:

a. Use correct and varied sentence types and sentence openings to reinforce the presentation of a lively and effective personal style.

b. Identify and use parallel structure in all written discourse, including similar grammatical forms to present items in a series, complements, and items juxtaposed for emphasis.

c. Use subordination, coordination, apposition, and other devices to indicate the relationship between ideas clearly.

d. Edit written manuscripts to reflect proper grammar.

e. Use correct punctuation and capitalization.

f. Use correct spelling conventions.

WRITTEN AND ORAL ENGLISH LANGUAGE CONVENTIONS

6. Students will write and speak with a command of standard English conventions.

By the end of grade 12:

a. Demonstrate control of grammar, paragraph and sentence structure, diction, and usage.

b. Produce legible work that shows accurate spelling and correct use of the conventions of punctuation and capitalization.

c. Reflect appropriate manuscript requirements in writing.

LISTENING AND SPEAKING

7. Students will listen and respond critically to oral communication. They speak in a manner that guides and informs the listener's understanding of key ideas, using appropriate phrasing, pitch, and modulation.

By the end of grade 4:

a. Ask thoughtful questions and respond to relevant questions with appropriate elaboration in oral settings. C2.4b; F1.4b; M10.3a; S5.12d; S6.2a

b. Summarize major ideas and supporting evidence presented in spoken messages and formal presentations. M10.3a; S5.12d

c. Identify how language (e.g., sayings, expressions, usages) reflects regions and cultures. F1.4d; F4.4b

d. Give precise directions and instructions. F1.4a; S5.5a

e. Present effective introductions and conclusions that guide and inform the listener's understanding of key ideas and evidence.

f. Use traditional structures for conveying information (e.g., cause and effect, similarity and difference, and posing and answering a question). M10.3a; M10.5ac

g. Emphasize points in ways that assist the listener or viewer in following key ideas and concepts. M10.3ab; M10.5ac

h. Use details, examples, anecdotes, or experiences to explain or clarify information. M10.3a; M9.3b; M10.5ac

i. Use volume, pitch, phrasing, pace, modulation, and gestures appropriately to enhance meaning. A11.4a; C2.4b; F3.4bc; F9.4b

j. Evaluate the role of the media in focusing attention on events and in forming opinions on issues. C9.4a

7. Students will deliver focused, coherent presentations that convey ideas clearly and relate to the background and interests of the audience. They evaluate the content of oral communication.

By the end of grade 8:

a. Analyze oral interpretations of literature, including language choice and delivery, and how they affect the listener(s). A12.8d

b. Paraphrase a speaker's purpose and point of view and ask relevant questions concerning the speaker's content, delivery, and purpose. M10.8c; S5.12d

c. Organize information to achieve particular purposes, matching message, vocabulary, voice modulation, expression, and tone to audience and purpose. C2.8b; M10.8c

d. Prepare a speech outline based on a chosen pattern of organization, generally including an introduction, transitions, previews, and summaries; a logically developed body; and an effective conclusion. C2.8b

e. Use precise language, action verbs, sensory details, appropriate and colorful modifiers, and active rather than passive voice in ways that enliven oral presentations. F1.8b

f. Use appropriate grammar, word choice, enunciation, and pace during formal presentations.

g. Use audience feedback (i.e., verbal and nonverbal cues) to reconsider and modify organizational structure/plan and to rearrange words and sentences to clarify meaning.

h. Evaluate the credibility of a speaker (e.g., hidden agendas, slanted or biased material).

i. Interpret and evaluate various ways that visual image-makers (e.g., graphic artists, illustrators, news photographers) communicate information and affect impressions and opinions. C12.8b

7. Students will formulate adroit judgments about oral communication. The deliver focused and coherent presentations of their own that convey clear and distinct perspectives and solid reasoning. They incorporate gestures, tone, and vocabulary tailored to audience and purpose.

By the end of grade 12:

GRADE 12

a. Recognize strategies media use (e.g., advertising, perpetuation of stereotypes, use of visual representations, special effects, language) to inform, persuade, entertain, and transmit culture. A11.12a; C9.12a

b. Analyze the impact of the media on the democratic process (e.g., its influence on elections and the way it creates images of leaders and shapes attitudes) at the local, state, and national level.

c. Interpret and evaluate the various ways that visual image-makers (e.g., graphic artists, documentary filmmakers, illustrators, news photographers) present events and communicate information. A13.12c

LISTENING AND SPEAKING

d. Use rhetorical questions, parallelism, concrete images, figurative language, characterization, irony, and dialogue to achieve clarity, force, and aesthetic effect.

e. Distinguish among, and use various forms of classical and contemporary logical argument, including inductive and deductive reasoning and syllogisms and analogies. M9.8d; M10.12ab

f. Use logical, ethical, and emotional appeals that enhance a specific tone and purpose.

g. Use appropriate rehearsal strategies to achieve command of text, skillful and artistic staging, and attention to performance details. A11.12ac; A13.12b

h. Use effective and interesting language, including informal usage for effect; standard English for clarity; and technical language for specificity.

i. Use research and analysis to justify strategies for gesture, movement, and vocalization, including dialect, pronunciation, and enunciation. A11.4b; A11.8c; A11.12a

j. Evaluate when to use different kinds of images (e.g., visual, music, sound effects, graphics) to create effective productions. A12.12ab

k. Critique the impact that a speaker's use of diction and syntax has on purpose and audience.

l. Identify logical fallacies used in oral addresses (e.g., attack ad hominem, false causality, red herring, overgeneralization, bandwagon). M9.12b

m. Analyze the four basic types of persuasive speeches (i.e. propositions of fact, value, problem, or policy), and understand the similarities and differences in their use of patterns of organization, persuasive language, reasoning, and proofs. M9.12b

n. Analyze the techniques used in media messages for a particular audience and evaluate their effectiveness (e.g., Orson Welles' radio broadcast, "War of the Worlds").

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8. Students will deliver brief recitations and oral presentations about familiar experiences or interests organized around a coherent thesis statement. Student speaking demonstrates a command of standard English and the organization and delivery strategies outlined in Standard 7.

By the end of grade 4:

a. Make narrative presentations on an incident that relate ideas, observations, and/or memories; provide context that enables the listener to imagine the circumstances in which the event or experience occurred; and provide insight into why the selected incident is memorable.

b. Make informational presentations that frame a key question; contain facts and details that help listeners focus; and incorporate more than one source of information (e.g., speakers, books, newspapers, television, or radio reports). H2.12b

c. Deliver oral summaries of articles and books that contain the main ideas of the event/article and the most significant details. H2.12b

d. Recite brief poems (i.e., two or three stanzas), brief soliloquies, or dramatic dialogues, using clear diction, tempo, volume, and paraphrasing. A11.4a; F3.4bc; F4.4c

8. Students will deliver well-organized formal presentations employing traditional rhetorical strategies (i.e., narration, exposition, persuasion, and description). Student speaking demonstrates a command of standard English and the organization and delivery strategies outlined in Standard 7.

By the end of grade 8:

a. Deliver clear, coherent narrative presentations (e.g., biographical, autobiographical) that relate an incident, event, or situation by using well-chosen details; reveal the significance of the subject's attitude about the incident, event, or situation; and employ narrative and descriptive strategies (e.g., relevant dialogue, specific action, physical description, background description, comparison or contrast of characters). F3.8b

b. Deliver oral responses to literature that interpret reading and provide insight; connect own responses to the writer's techniques and to specific textual references; draw supported inferences about the effects of a literary work on its audience; and support judgments through references to the text, other works, other authors, or personal knowledge.

c. Deliver research presentations that define a thesis; record important ideas, concepts, direct quotations from significant information sources, paraphrasing and summarizing all relevant perspectives on the topic, as appropriate; use a variety of primary and secondary sources, distinguishing the nature and value of each; and organize and record information on charts, maps, and graphs. H2.12e

d. Deliver persuasive presentations that include well-defined theses making clear and knowledgeable judgments; support arguments with detailed evidence, examples and reasoning, differentiating evidence from opinion; effectively anticipate and answer listener concerns and counterarguments through the inclusion and arrangement of details, reasons, examples, and other elements; and maintain a reasonable tone. A11.8c

e. Recite poems (four to six stanzas), sections of speeches, or dramatic soliloquies, using voice modulation, tone, and gestures expressively to enhance meaning. F3.8a

8. Students will deliver polished formal and extemporaneous presentations that combine traditional rhetorical strategies of narration, exposition, persuasion, and description. Student speaking demonstrates a command of standard English and the organization and delivery strategies outlined in Standard 7.

By the end of grade 12:

a. Deliver reflective presentations that explore the significance of personal experiences, events, conditions, or concerns, using rhetorical strategies (e.g., narration, description, exposition); draw comparisons between the specific incident and broader themes that illustrate the speaker's beliefs or generalizations about life; and maintain a balance between describing the incident and relating it to more general abstract ideas.

b. Deliver oral reports on historical investigations that use exposition, narration, description, argumentation, or some combination of the four modes of presentation to support the main proposition; analyze several historical records of a single event, examining critical relationships between and among elements of the research topic; explain the perceived reason(s) for the similarities and differences, using information derived from primary and secondary sources to support or enhance the presentation; and include information on all relevant perspectives, considering the validity and reliability of sources. H2.12bc; H3.12bfghk

c. Deliver oral responses to literature that demonstrate a comprehensive understanding of the significant ideas of works or passages by making assertions about the text that are reasonable and supportable; analyze the use of imagery, language, universal themes, and unique aspects of text through the use of rhetorical strategies (i.e., narration, description, argumentation, exposition, or some combination of the four); support key ideas and viewpoints through accurate and detailed references to the text or to other works; demonstrate awareness of the author's use of stylistic devices and appreciation of the effects created; and identify and assess the impact of perceived ambiguities, nuances, and complexities within text.

d. Deliver multimedia presentations that combine text, images, and sound, incorporating information from a wide range of media, including television, videos, films, newspapers, magazines, CD-ROMs, on-line information, and computer-media-generated images; select an appropriate medium for each element of the presentation; use the selected media skillfully, including edits and monitoring for quality; and test audience response and revise the presentation accordingly. A10.12b; A12.12ab; A13.12a

e. Recite poems, selections from speeches, or dramatic soliloquies with attention to performance details to achieve clarity, force, and aesthetic effect and to demonstrate understanding of meaning (e.g., "To Be or Not to Be" from Shakespeare's *Hamlet*). A11.12a

Suggested List of Authors, Illustrators, or Works Reflecting Our Common Literary and Cultural Heritage

All American students must acquire knowledge of a range of literary works reflecting our common literary heritage. It is a heritage that goes back thousands of years to the ancient world. In addition, all students should become familiar with some of the outstanding works in the rich body of literature that is their particular heritage in the English-speaking world. This includes that literature created just for children because its authors saw childhood as a special period in life.

The suggestions below constitute a core list of those authors, illustrators, and works that comprise the literary and intellectual capital drawn on by those who write in English, whether for novels, poems, newspapers, or public speeches, in this country or elsewhere. A knowledge of these authors, illustrators, and works in their original, adapted, or revised editions will contribute significantly to a student's ability to understand literary allusions and participate effectively in our common civic culture.

Effective English language arts teachers teach all students to comprehend and analyze a variety of significant literature. To ensure that all students read challenging material, teachers may choose to present excerpts of longer works or vary the amount of class time devoted to a specific work or cluster of works. As all English teachers know, although some authors have written many works, not all are of equally high quality. We expect teachers to use their literary judgment in making selections.

The suggested lists are organized by the grade-span levels of PreK-2, 3-4, 5-8, and 9-12. Certain key works or authors are repeated in adjoining grade spans, giving teachers the option to match individual students with the books that suit their interests and developmental levels. The decision to present a grades 9-12 list (as opposed to grades 9-10 and 11-12) stems from the recognition that teachers should be free to choose selections that challenge, but do not overwhelm, their students.

(Selections were reviewed by the editors of *Horn Book Magazine.*)

PreK-2

Mother Goose nursery rhymes, *Aesop's Fables*, Rudyard Kipling's *Just So Stories*, selected Grimm and Hans Christian Andersen fairy tales, and selected French fairy tales.

The Bible as literature:

Tales including Jonah and the whale, Daniel and lions' den, Noah and the Ark, Moses and the burning bush, David and Goliath, and the story of Ruth.

At least one work or selection from each of the following picture book authors and illustrators:

Ludwig Bemelmans, Margaret Wise Brown, John Burningham, Virginia Lee Burton, Randolph Caldecott, Edgar Parin and Ingri D'Aulaire, William Pène du Bois, Wanda Gág, Theodore Geisel (Dr. Seuss), Kate Greenaway, Shirley Hughes, Crockett Johnson, Robert Lawson, Munro Leaf, Robert McCloskey, A. A. Milne, William Nicholson, Maud and Miska Petersham, Alice and Martin Provensen, Beatrix Potter, H. A. and Margaret Rey, Maurice Sendak, and Vera Williams.

At least one poem by each of the following poets:

John Ciardi, Rachel Field, David McCord, A. A. Milne, and Laura Richards.

Grades 3-4

The Bible as literature:

Adam and Eve, Cain and Abel, David and Jonathan, the Prodigal Son, the visit of the Magi, and well-known psalms (including 23, 24, 46, 92, 121, and 150).

Greek, Roman, or Norse myths; Native American myths and legends; North American folktales and legends; and stories about King Arthur and Robin Hood.

At least one work, excerpt, or selection from each of the following British authors:

Frances Burnett, Lewis Carroll, Kenneth Grahame, Dick King-Smith, Edith Nesbit, Mary Norton, Margery Sharp, Robert Louis Stevenson, and P. L. Travers.

At least one work, excerpt, or selection from each of the following American authors or illustrators:

L. Frank Baum, Beverly Cleary, Elizabeth Coatsworth, Mary Mapes Dodge, Elizabeth Enright, Eleanor Estes, Jean George, Sterling North, Howard Pyle, Marjorie Kinnan Rawlings, Carl Sandburg, George Selden, Louis Slobodkin, E. B. White, Laura Ingalls Wilder.

At least one poem by each of the following poets:

Stephen Vincent and Rosemarie Carr Benét, Lewis Carroll, John Ciardi, Rachel Field, Robert Frost, Langston Hughes, Edward Lear, Myra Cohn Livingston, David McCord, A.A. Milne, Laura Richards.

Grades 5-8

Selections from Grimm's fairy tales, French fairy tales, and tales by Hans Christian Andersen and Rudyard Kipling.

Examples of *Aesop's Fables*; Greek, Roman, or Norse myths; Native American myths and legends; North and South American folktales and legends; Asian and African folktales and legends; stories about King Arthur, Robin Hood, Beowulf and Grendel, and St. George and the Dragon.

The Bible as literature:

Old Testament: Genesis, Ten Commandments, Psalms and Proverbs. New Testament: Sermon on the Mount and Parables.

At least one work, excerpt, or selection from each of the following British and European authors or illustrators:

James Barrie, Frances Burnett, Lucy Boston, Lewis Carroll, Carlo Collodi, Charles Dickens, Arthur Conan Doyle, Daniel Defoe, Leon Garfield, Kenneth Grahame, C. S. Lewis, George MacDonald, Edith Nesbit, Mary Norton, Philippa Pearce, Arthur Rackham, Anna Sewell, William Shakespeare, Johanna Spyri, Robert Louis Stevenson, Jonathan Swift, J. R. R. Tolkien, P. L. Travers, T. H. White.

At least one work, excerpt, or selection from each of the following American authors or illustrators:

Louisa May Alcott, Lloyd Alexander, Natalie Babbitt, L. Frank Baum, Nathaniel Benchley, Carol Ryrie Brink, Elizabeth Coatsworth, Esther Forbes, Paula Fox, Jean George, Virginia Hamilton, Bret Harte, Irene Hunt, Washington Irving, Sterling North, Scott O'Dell, Maxfield Parrish, Howard Pyle, Edgar Allan Poe, Ellen Raskin, Marjorie Kinnan Rawlings, Elizabeth Speare, Anna Sewell, Booth Tarkington, Mark Twain, James Thurber, E. B. White, Laura Ingalls Wilder, N. C. Wyeth.

At least one poem by each of the following poets:
Stephen Vincent and Rosemarie Carr Benét, Lewis Carroll, John Ciardi, Rachel Field, Robert Frost, Langston Hughes, Edward Lear, Henry Wadsworth Longfellow, David McCord, and Ogden Nash.

Grades 9-12

American Literature

Historical documents of literary and philosophical significance:
Abraham Lincoln's Gettysburg Address, the Declaration of Independence, Martin Luther King Jr.'s "Letter from Birmingham City Jail" or his "I Have a Dream" speech, John F. Kennedy's inaugural speech, and William Faulkner's Nobel Prize Lecture.

At least one work, excerpt, or selection
by each of these major writers of the eighteenth and nineteenth centuries:
James Fenimore Cooper, Stephen Crane, Emily Dickinson, Frederick Douglass, Ralph Waldo Emerson, Benjamin Franklin, Nathaniel Hawthorne, Henry James, Thomas Jefferson, Herman Melville, Edgar Allan Poe, Henry David Thoreau, Mark Twain, Phillis Wheatley, and Walt Whitman.

At least one work, excerpt, or selection
by each of these major writers of the twentieth century:
Henry Adams, James Baldwin, Arna Bontemps, Willa Cather, Kate Chopin, Countee Cullen, Ralph Ellison, William Faulkner, Jessie Fauset, F. Scott Fitzgerald, Charlotte Gilman, James Weldon Johnson, Ernest Hemingway, O. Henry, Langston Hughes, Zora Neale Hurston, Sarah Orne Jewett, Flannery O'Connor, Ayn Rand, Gertrude Stein, John Steinbeck, James Thurber, Jean Toomer, Booker T. Washington, Edith Wharton, and Richard Wright.

At least one play by each of the following playwrights:
Lorraine Hansberry, Lillian Hellman, Arthur Miller, Eugene O'Neill, Thornton Wilder, Tennessee Williams, and August Wilson.

At least one work by each of the following major poets:
Elizabeth Bishop, e e cummings, Emily Dickinson, Robert Frost, T. S. Eliot, Robinson Jeffers, Amy Lowell, Robert Lowell, Edgar Lee Masters, Edna St. Vincent Millay, Marianne Moore, Sylvia Plath, Ezra Pound, John Ransom, Edward Arlington Robinson, Theodore Roethke, Wallace Stevens, Alan Tate, Sara Teasdale, and William Carlos Williams.

At least one work or selection about the European, Asian, Caribbean, Central American, and South American immigrant experience, the experiences of

Native Americans (such as Ole Rolvaag, Younghill Kang, and Abraham Cahan), and slave narratives (such as Harriet Jacobs).

British and European Literature

The Bible as literature:

Genesis, Ten Commandments, Psalms and Proverbs, Job, Sermon on the Mount, and Parables.

A higher level rereading of Greek mythology, and selections from Chaucer's *Canterbury Tales.*

Poetry:

At least one substantial selection from Homer's works.
At least one substantial selection from epic poetry: Dante and John Milton.
At least six sonnets: William Shakespeare, John Milton, and Edmund Spenser.
At least three examples of metaphysical poetry: John Donne, George Herbert, and Andrew Marvell.

At least six examples from each of the following Romantic poets: William Blake, Lord Byron, Samuel Taylor Coleridge, John Keats, Percy Bysshe Shelley, and William Wordsworth.

At least three works of Victorian poetry: Matthew Arnold, Elizabeth Barrett Browning, Robert Browning, Dante Gabriel Rossetti, and Alfred Lord Tennyson.

At least three works of modern poetry: W. H. Auden, A. E. Housman, Dylan Thomas, and William Butler Yeats.

Drama:

At least one classical Greek drama.
At least two plays by William Shakespeare.
At least one play by Anton Chekhov, Henrik Ibsen, George Bernard Shaw, and Oscar Wilde.

Essays:

At least four British essays: Joseph Addison, Sir Francis Bacon, Samuel Johnson in "The Rambler," Charles Lamb, George Orwell, Leonard Woolf, and Virginia Woolf.

At least two selections from the Enlightenment: Voltaire, Diderot and other Encyclopédistes, and Jean Jacques Rousseau.

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Fiction:

At least one selection from an early novel: *La Vida de Lazarillo de Tormes*, Miguel de Cervantes' *Don Quixote*, Henry Fielding's *Joseph Andrews*, and Oliver Goldsmith's *The Vicar of Wakefield*.

A substantial selection from John Bunyan's allegory, *Pilgrim's Progress*.

A substantial work, excerpt, or selection from satire, or mock epic, verse or prose: Lord Byron, Alexander Pope, and Jonathan Swift.

At least two nineteenth-century novels: Jane Austen, Emily Brontë, Joseph Conrad, Charles Dickens, Fyodor Dostoyevsky, George Eliot, Thomas Hardy, Victor Hugo, Mary Shelley, and Leo Tolstoy.

At least one twentieth-century novel: Albert Camus, André Gide, James Joyce, Franz Kafka, D.H. Lawrence, Jean Paul Sartre, and Virginia Woolf.

Suggested Lists of Contemporary American Literature and World Literature

All students should be familiar with American authors and illustrators of the present and those who established their reputations after the end of World War II, as well as important writers from around the world, both historical and contemporary. During the last half of the twentieth century, the publishing industry in the United States has devoted increasing resources to children's and young adult literature created by writers and illustrators from a variety of backgrounds. Many newer anthologies and textbooks offer excellent selections of contemporary and world literature.

As they choose works for class reading or suggest books for independent reading, teachers should ensure that their students are both engaged and appropriately challenged by their selections. The lists below are organized by grade spans PreK-2, 3-4, 5-8, and 9-12, but these divisions are far from rigid, particularly for the elementary and middle grades. Many contemporary authors write stories, poetry, and nonfiction for very young children, for those in the middle grades, and for adults as well. As children become independent readers, they often are eager and ready to read authors that may be listed at a higher level. Teachers and librarians need to be good matchmakers, capable of getting the right books into a child's hands at the right time.

The suggested lists below are provided as a starting point. They are necessarily incomplete because excellent new writers appear every year. As all English teachers know, although some authors have written many works, not all are of equally high quality. We expect teachers to use their literary

judgment in selecting any particular work. A comprehensive education in literature curriculum balances these authors and illustrators with those found in the suggested list above.

Contemporary Literature of the United States

(Note: The lists for PreK-8 include writers and illustrators from other countries whose works are available in the United States. Selections were reviewed by the editors of *Horn Book Magazine.*)

PreK-2

Arnold Adoff, Aliki, Mitsumasa Anno, Edward Ardizzone, Molly Bang, Raymond Briggs, Marc Brown, Marcia Brown, Margaret Wise Brown, Ashley Bryan, Eve Bunting, Eric Carle, Lucille Clifton, Barbara Cooney, Donald Crews, Tomie dePaola, Leo and Diane Dillon, Tom Feelings, Gail Gibbons, Eloise Greenfield, Ann Grifalconi, Helen Griffith, Donald Hall, Florence Heide, Russell and Lillian Hoban, Tana Hoban, Thacher Hurd, Trina Schart Hyman, Ezra Jack Keats, Steven Kellogg, Leo Lionni, Arnold Lobel, Gerald McDermott, Patricia McKissack, Bill Martin, James Marshall, Else Holmelund Minarik, Robert Munsch, Jerry Pinkney, Jack Prelutsky, Faith Ringgold, Glen Rounds, Cynthia Rylant, Allen Say, Marcia Sewall, Marjorie Sharmat, Peter Spier, William Steig, John Steptoe, Tomi Ungerer, Chris Van Allsburg, Jean van Leeuwen, Judith Viorst, Rosemary Wells, Shigeo Watanabe, Brian Wildsmith, Vera Williams, Ed Young, Margot and Harve Zemach, and Charlotte Zolotow.

Grades 3-4

Judy Blume, Joseph Bruchac, Betsy Byars, Ann Cameron, Eleanor Coerr, Joanna Cole, Paula Danziger, Edward Eager, Walter Farley, John Fitzgerald, Louise Fitzhugh, Sid Fleischman, Jean Fritz, John Reynolds Gardiner, Jamie Gilson, Paul Goble, Edward Gorey, Jane Langton, Patricia Lauber, Jacob Lawrence, Julius Lester, David Macaulay, Patricia MacLachlan, Barry Moser, Emily Neville, Daniel Pinkwater, Alvin Schwartz, John Scieszka, Shel Silverstein, Mildred Taylor, Mildred Pitts Walter, Laurence Yep, and Jane Yolen.

Grades 5-8

Isaac Asimov, Avi, James Berry, Nancy Bond, Ray Bradbury, Bruce Brooks, Alice Childress, Vera and Bill Cleaver, James and Christopher Collier, Susan Cooper, Robert Cormier, Chris Crutcher, Michael Dorris, Paul Fleischman, Russell Freedman, Leon Garfield, Sheila Gordon, Bette Greene, Rosa Guy, Mary Downing Hahn, Joyce Hansen, James Herriot, S. E. Hinton, Felice Holman, Norton Juster, M. E. Kerr, E. L. Konigsburg, Kathryn Lasky, Ursula LeGuin, Madeleine L'Engle, Lois Lowry, Anne McCaffrey, Robin McKinley, Margaret Mahy, Milton Meltzer, L. M. Montgomery, Walter Dean Myers,

Lensey Namioka, Phyllis Reynolds Naylor, Katherine Paterson, Gary Paulsen, Richard Peck, Robert Newton Peck, Ellen Raskin, Isaac Bashevis Singer, Gary Soto, Theodore Taylor, Yoshiko Uchida, Cynthia Voigt, Yoko Kawashima Watkins, and Paul Zindel.

Grades 9-12

Contemporary Literature of the United States

Fiction:

James Agee, Maya Angelou, John Barth, Donald Barthelme, Saul Bellow, Joan Blos, Rita Mae Brown, Pearl Buck, Raymond Carver, John Cheever, Sandra Cisneros, Arthur C. Clarke, Don DeLillo, E.L. Doctorow, Louise Erdrich, Nicholas Gage, Ernest K. Gaines, Alex Haley, Joseph Heller, William Hoffman, John Irving, William Kennedy, Ken Kesey, Jamaica Kincaid, Maxine Hong Kingston, Louis L'Amour, Harper Lee, Norman Mailer, Bernard Malamud, Paule Marshall, Carson McCullers, Terry McMillan, Toni Morrison, John Nichols, Joyce Carol Oates, Edwin O'Connor, Cynthia Ozick, Americo Paredes, Walker Percy, Chaim Potok, Reynolds Price, Annie Proulx, Ayn Rand, Leo Rosten, Saki, J. D. Salinger, William Saroyan, May Sarton, Betty Smith, Wallace Stegner, Amy Tan, John Kennedy Toole, Anne Tyler, John Updike, Kurt Vonnegut, Jr., Alice Walker, Robert Penn Warren, Eudora Welty, Thomas Wolfe, and Tobias Wolff.

Poetry:

Julia Alvarez, A. R. Ammons, Maya Angelou, John Ashberry, Amirai Baraka (LeRoi Jones), Elizabeth Bishop, Louise Bogan, Gwendolyn Brooks, Sterling Brown, Hayden Carruth, J. V. Cunningham, Rita Dove, Alan Dugan, Bob Dylan, Richard Eberhart, Martin Espada, Allen Ginsberg, Louise Gluck, John Haines, Robert Hayden, Anthony Hecht, Randall Jarrell, June Jordan, Weldon Kees, X.J. Kennedy, Galway Kinnell, Stanley Kunitz, Philip Levine, Audrey Lord, Amy Lowell, Robert Lowell, Louis MacNeice, William Meredith, James Merrill, Sylvia Plath, Ishmael Reed, Adrienne Rich, Theodore Roethke, Mark Strand, Gjertrud Schnackenberg, Anne Sexton, Karl Shapiro, Robert K. Shaw, Gary Snyder, William Stafford, May Swenson, Margaret Walker, Richard Wilbur, Charles Wright, and Elinor Wylie.

Essay/Nonfiction (Contemporary and Historical):

Edward Abbey, Susan B. Anthony, Russell Baker, Jack Beatty, Ambrose Bierce, Carol Bly, Dee Brown, Art Buchwald, Rachel Carson, Margaret Cheney, Stanley Crouch, Joan Didion, Annie Dillard, W. E. B. Du Bois, Gretel Ehrlich, Loren Eiseley, Henry Louis Gates, Jr., Doris Goodwin, Stephen Jay Gould, John Gunther, John Hersey, Edward Hoagland, Helen Keller, William Least Heat Moon, Barry Lopez, J. Anthony Lukas, Mary McCarthy, Ed McClanahan, John McPhee, William Manchester, N. Scott Momaday, Samuel Eliot Morison, Lance Morrow, Bill Moyers, John Muir,

Harry Mark Petrakis, Richard Rodriguez, Eleanor Roosevelt, Franklin D. Roosevelt, Theodore Roosevelt, Oliver Sacks, Carl Sagan, Simon Schama, William Shirer, Shelby Steele, I. F. Stone, Lewis Thomas, Lawrence Wechsler, Walter Muir Whitehill, Terry Tempest Williams, and Malcolm X.

Drama:

Edward Albee, Robert Bolt, Truman Capote, Tom Cole, Christopher Durang, DuBose Heyward, Arthur Kopit, Jerome Lawrence, Robert E. Lee, Archibald MacLeish, David Mamet, Marsha Norman, Terrence Rattigan, Ntozake Shange, Sam Shepard, Neil Simon, Wendy Wasserstein, Orson Welles, Thornton Wilder, and Tennessee Williams.

Historical and Contemporary World Literature

Fiction:

Chinua Achebe, S. Y. Agnon, Ilse Aichinger, Isabel Allende, Jerzy Andrzejewski, Margaret Atwood, Miriama Ba, Isaac Babel, Julian Barnes, James Berry, Heinrich Boll, Jorge Luis Borges, Mikhail Bulghakov, Dino Buzzati, A. S. Byatt, Italo Calvino, Margarita Canseco del Valle, Karl Capek, Carlo Cassola, Camillo Jose Cela, Theresa Hak Kyung Cha, Julio Cortazar, Nafissatou Diallo, Isak Dinesen, Margaret Drabble, Buchi Emecheta, Aminata Sow Fall, E. M. Forster, John Fowles, Nikolai Gogol, William Golding, Nadine Gordimer, Robert Graves, Jessica Hagedorn, Lely Hayslip, Bessie Head, Hermann Hesse, Wolfgang Hildesheimer, Aldous Huxley, Kazuo Ishiguro, Yuri Kazakov, Milan Kundera, Camara Laye, Stanislaw Lem, Primo Levi, Jacov Lind, Clarice Lispector, Naguib Mahfouz, Thomas Mann, Gabriel Garcia Marquez, Yukio Mishima, Alberto Moravia, Vladimir Nabokov, Anna Maria Ortoso, Alan Paton, Cesar Pavese, Santha Rama Rau, Christa Renig, Rainer Maria Rilke, Ru Zhijuan, Salman Rushdie, Ignazio Silone, Isaac Bashevis Singer, Antonio Skarmeta, Alexander Solzenitsyn, Ngugi wa Thiong'o, Niccolo Tucci, Mario Vargas-Llosa, Vladimir Voinovich, Elie Wiesel, and Emile Zola.

Poetry:

Bella Akhmadulina, Anna Akhmatova, Rafael Alberti, Yehudi Amichai, Demetrios Antoniou, Chaim Bialik, Georges Brassens, Jacques Brel, Josif Brodsky, Constantine Cavafis, Paul Celan, Odysseus Elytis, Pierre Emmanuel, Seamus Heaney, Zoe Kafelli, Kostas Karlotakis, Philip Larkin, Federico García Lorca, Joseph Majault, Czeslaw Milosz, Gabriela Mistral, Pablo Neruda, D. Niane, Jacques Prévert, Alexander Pushkin, Juan Ramon Ramirez, Arthur Rimbaud, Yannis Ritsos, Pierre de Ronsard, George Seferis, Léopold Sèdar Senghor, Vikram Seth, Wole Soyinka, Marina Tsvetaeva, Paul Verlaine, Andrei Voznesensky, Derek Walcott, and Yevgeny Yevtushenko.

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Essay/Nonfiction:

Aisin-Gioro P'u Yi, Winston Churchill, Mahatma Gandhi, Steven Hawking, Carl Jung, Arthur Koestler, Margaret Laurence, Doris Lessing, Michel de Montaigne, Shiva Naipaul, Octavio Paz, Jean Jacques Rousseau, Alexis de Tocqueville, Voltaire, Rebecca West, and Marguerite Yourcenar.

Drama:

Jean Anouilh, Samuel Beckett, Bertolt Brecht, Albert Camus, Jean Cocteau, Athol Fugard, Jean Giraudoux, Eugene Ionesco, Molière, John Mortimer, Sean O'Casey, John Osborne, Harold Pinter, Luigi Pirandello, Jean-Paul Sartre, and John Millington Synge.

Selections from religious literature:

Analects of Confucius, Bhagavad-Gita, the Koran, Tao Te Ching, Book of the Hopi, Zen parables, and Buddhist scripture.

Foreign Language Standards

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Foreign Language Standards Introduction

Knowing how, when, and why to say what to whom: This phrase, first spoken during the development of the national foreign language standards, encapsulates in a few words the ideal result of education in a language other than one's own. At the same time that affordable travel, mushrooming technology, cable channels, and continued waves of immigrants to the United States make the sounds of foreign languages much less "foreign" to American ears, we are also coming to realize that facility with a language other than the native tongue is not a mere exotic frill of K-12 education. It is an essential tool for getting along in the world, perhaps for living more richly in a community, and for stretching the mind in ways that only language can.

From the earliest days of our nation, we have been a linguistic stew. Besides English–and a wide variety of it–our air has been filled with the sounds of German, Spanish, Dutch, French, Portuguese, Polish, and various Native American languages, and the sight of sign language is not uncommon. The complete list is much longer. Although English came to be the predominant language of the United States and its people, there has never been a time when there weren't communities in which a language other than English was used often, at least at home and not infrequently in the shops. Even today, Romanian is spoken in dense clusters in southern California. The Italian which dominated Federal Hill in Providence is making way for Thai, and pockets of German and Czech speakers are scattered throughout the West and Midwest.

But because most people in the United States speak English, and because English is the language of government and most businesses, does all that really matter? It does. On an economic basis alone, having a populace able to speak a language other than English and able to understand other cultures is vital to our nation's well-being.

Consider a commodity as simple and unglamorous as chicken. In a 1994 town meeting, James Nelson, CEO of Arbor Acres Farms, which breeds chickens and turkeys, spoke about the need to continue foreign language education in the Glastonbury, Connecticut, public schools. He explained that he grew up on a Midwestern farm with no expectation or incentive to learn a foreign language. Later, during service in the Peace Corps, he learned that "being in a foreign country whose language you do not read, understand, or speak is akin to being illiterate, deaf, and mute, all at the same time." His

company now has operations in Japan, China, Hungary, Thailand, Taiwan, Zambia, Holland, Mexico, Peru, Colombia, Venezuela, Brazil, Argentina, Chile, Egypt, Israel, Saudi Arabia, India, Malaysia, Indonesia, Korea, and the Philippines. All senior and middle managers and technicians in the international operations are either bi-, tri-, or quadrilingual, and seventeen different languages are spoken by the company's United States–based international team.

Mr. Nelson's experience in the business world is not an anomaly. If companies do not operate overseas, they still need to communicate with all potential customers in the United States. It is impossible to effectively market and service any product to a customer whose language you do not speak and whose culture you do not understand. The ability to communicate with your customers in their own languages promotes trust and confidence, makes negotiations easier, gives a company the ability to predict and avoid pitfalls, and permits operation from a position of strength. Communication proceeds with the confidence that what is said is the same as was intended, and what is heard has not been filtered through incorrectly nuanced translation.

But there is more to be gained from foreign language study than a leg up in business, important though that is. We profit in ways far beyond the monetary when new worlds open up to us. Learning to speak the language of another culture fulfills a deep human need to communicate—we want to talk with others, read and hear what others have to say, tell them what we want them to know about us. When we can do this, we better appreciate the goings-on in the world and in our own neighborhoods, we find the strange or incomprehensible has been transformed into the fascinating—or at least the understandable. A new language gives us new eyes.

The study of another language also gives one insight into the nature of language itself. Through study of the structure of a new language, students come to understand the structure of their native tongue, as well, and come to see that language is much more than mere words—it is gesture, expression,tone of voice, context, ways of thinking. All of this is so thoroughly and naturally grounded in culture that most of us don't think about it, until we encounter people from another culture—in the neighborhood, on the long-awaited vacation abroad, in the workplace—and notice that their ways are different. Through the study of languages, students can learn to see these differences as interesting rather than odd. Students who learn a second

language also come to see that there is cultural context in even their native language. Words that developed out of a common root suddenly have new shades of meaning, and it becomes a fascinating exercise to discover how words and structures are similar or different among languages.

The knowledge of another language becomes a true gift when one is able to read literature in the original, and appreciate all the subtleties of a language that can be lost when a work (a poem, a novel) is translated. To read a great novel or poem in translation is akin to viewing a masterpiece through gauze. Humor, pathos, irony, the elements of tragedy—all these have cultural roots, and each will be lost to the reader who has no understanding of the culture in which a work was written, and who must rely on someone's translation.

Knowing how, when, and why to say what to whom drives the organization of the SEE standards, as it did the national foreign language standards. The standards have been organized under goals which reflect that organization, which is a clear departure from the foreign language instruction most of us have experienced. The communication and cultures goals do not focus on simply *how* (grammar) to say *what* (vocabulary). Though grammar and vocabulary are still essential elements of a foreign language education, they are in no way sufficient. Genuine communication must also consider the *why*, the *whom*, and the *when*. The communications and cultures goals both focus strongly on these elements of language. The connections goal sets expectations that students will use the new language for more than social interaction and will be able to use it to strengthen skills in other subject areas. This approach is logical, since good foreign language teaching necessarily includes geography, history, literature, and the arts and should extend beyond even these to allow students to do research and study in mathematics and science. The comparisons goal helps students develop insight into the nature of language.

The Standards for Excellence in Education (SEE) foreign language standards closely follow the national standards (*Standards for Foreign Language Learning: Preparing for the 21st Century*). First, as in the national document, the SEE standards are applicable to the study of any language, commonly spoken or not, alphabetic or not, ancient or modern. Second, SEE follows the national standards in not creating an artificial split between skills and

content. Though the SEE's communication standards might seem to be purely skill oriented, a closer look shows that students must have a knowledge of relevant, culturally grounded content in order to meet them. Similarly, though the SEE standards for cultures, connections, and comparisons seem on their face to be largely concerned with content knowledge, students must have facility with the language to meet these standards. And third, the SEE foreign language standards follow the national model in recommending that foreign language study begin in the elementary grades. Though these standards could conceivably be met even if instruction were started later, the challenge to the student would be far greater.

The SEE standards do depart from the national foreign language standards in one significant respect. The national standards contain a fifth goal, communities, which is not included here. (It should be noted, however, that this goal received significant support from the advisory council for the national foreign language project.) The inclusion of this goal was one of the elements that made the national document such a step forward in foreign language education, because it underlined the importance of foreign language knowledge and skill as lively, essential attributes of a well-educated person. It said, in effect, "This is not simply an academic exercise. This ability only comes to mean something when it leaves the classroom doors and ventures out to the rest of the world—or just down the street." The benchmarks contained in this standard, however, were not remarkably distinct from those established under the other four goals. This is logical, because the benchmarks in the standards for the other goals were crafted to be as meaningful in, and representative of, real life as possible. Thus, when the "real life" goal was written, there was great similarity in the benchmarks. Because one of the main purposes of the SEE project was to condense the standards, and one of the main means for doing so was to remove or combine standards that were very similar, the benchmarks for the communities goal were removed. The reader is urged to turn to the original national foreign language standards for the full text of all the goals, standards, and benchmarks and for the slightly more technical terms that will be more familiar to the foreign language professional.

Standards for Foreign Language Learning: Preparing for the 21st Century can be obtained by calling Allen Marketing and Management (Lawrence, KS) at 1-800-627-0629.

COMMUNICATION

1. Students will converse, provide and obtain information, express feelings, emotions, and ideas, and exchange opinions in the language studied.

By the end of grade 4:

a. Give and follow simple instructions as part of age-appropriate classroom or cultural activities or both. E7.4d; S5.5a

b. Ask and answer questions about various topics, such as school events, celebrations, personal opinions, and family, orally or in writing. E7.4a

c. Exchange descriptions of people and products of the culture (such as toys, dress, types of dwellings, and foods) with each other and with the class as a group.

d. Perform greetings, leave-takings, and common classroom interactions using culturally appropriate gestures and oral expressions. F7.4c; S28.2b

By the end of grade 8:

a. Follow and give directions for participating in age-appropriate cultural activities and investigating the function of products of the foreign culture and ask and respond to questions for clarification. S5.8a

b. Exchange detailed information and compare, contrast, and express opinions and preferences about personal events, memorable experiences, and other school subjects with peers or members of the cultures studied. E7.8e

c. Acquire goods, services, or information orally or in writing.

d. Discuss school and community issues and problems. C1.4c

By the end of grade 12:

a. Develop, discuss, and present solutions to important issues and problems of the cultures studied. C1.12c; C10.12b

b. Present analyses and reactions to expository and literary texts with peers or speakers of the language studied or both. E2.12ce; E3.12bcdfghi

c. Exchange, support, and discuss their opinions with fluid use of language on a variety of topics dealing with contemporary and historical issues. C10.12bc

2. Students will understand and interpret writing and speech on a variety of topics in the language studied.

By the end of grade 4:

a. Comprehend main ideas of age-appropriate stories such as personal anecdotes, familiar fairy tales, and other narratives based on familiar themes. E3.4ad; H32.4a

b. Use oral and written description to identify people and objects found in their environment or in other school subjects.

c. Comprehend brief written messages and short personal notes on familiar topics such as family, school events, and celebrations.

d. Comprehend the main themes and ideas and identify the principal characters of stories, including children's literature. E3.4bd; E5.4d; H32.4a

e. Comprehend the principal message contained in media such as illustrated texts, posters, or advertisements. E5.4d

f. Correctly interpret gestures, intonation, and other visual or auditory cues. A11.4a

By the end of grade 8:

a. Comprehend written and spoken information about other school subjects; use knowledge acquired in other settings and from other subject areas to comprehend spoken and written messages in the language studied.

b. Understand announcements and messages connected to daily activities in the cultures studied.

c. Understand the main themes and significant details from products of the cultures as presented on TV, radio, or video or in live presentations. C2.8a

d. Understand the main themes and significant details from printed products of the cultures as found in literature, newspapers, magazines, e-mail, or other sources used by speakers of the language studied. C2.8a; E3.4b

COMMUNICATION

By the end of grade 12:

a. Demonstrate an understanding of the main ideas and significant details of live and recorded discussions, lectures, and presentations on current or past events from the cultures studied or another school class. C2.12a

b. Demonstrate an understanding of the principal elements of nonfiction articles on topics of current and historical importance to members of the culture. C2.12b; G6.8d

c. Analyze the main plot, subplot, and the descriptions, roles, and significance of characters in primary source texts. E3.8b

d. Demonstrate an understanding of the cultural nuances of meaning in written and spoken language, as expressed by speakers of the language studied in formal and informal settings. E3.12g

e. Demonstrate an understanding of the cultural nuances of meaning in expressive products of the culture, including selections from various literary genres and the visual arts. E3.12g

3. Students will present information, concepts, and ideas to an audience of listeners or readers on a variety of topics in the language studied.

By the end of grade 4:

a. Deliver short oral messages or written reports and exchange the information with another language class either locally or at a distance. M10.3b and 5ac

b. Dramatize songs, share anecdotes, or recite poetry commonly known by peers in the cultures studied, for an appropriate audience. A10.4ad; A5.4a; A12.4d; E7.4i; E8.4d

c. Tell or retell stories, orally or in writing, and share them with an audience, such as the class. A10.4a; E7.4c; E8.4d

By the end of grade 8:

a. Present short plays and skits, recite selected poems and anecdotes, and perform songs in the language studied for an adult audience. A10.8c; A12.8c; A13.8b; A5.8c; E8.8e

b. Present stories or written reports about personal experiences, personal events, or other school subjects to classmates or members of the cultures studied. E8.8a; E5.8a

c. Prepare an oral or written summary of the plot and characters in age-appropriate literature.

By the end of grade 12:

a. Perform scenes from plays or recite poems or excerpts from literature commonly read by speakers of the language studied. A10.12b; E8.12e

b. Create stories, poems, short plays, or skits based on themes, ideas, and perspectives from the cultures studied. A10.12a

c. Summarize articles or documentaries intended for native speakers of the language studied and discuss the topics orally or in writing with other speakers of the language. M10.12a

d. Write a letter or an article for a student publication describing and analyzing an issue. C1.12c; C2.12b; E4.12c

e. Prepare and present a research-based analysis of a current event from the perspective of both the United States and the cultures studied. C12.12b; E4.12c

CULTURES

4. Students will demonstrate an understanding of the practices and perspectives of the cultures studied and the relationship between them.

By the end of grade 4:

a. Observe, identify, or discuss simple patterns of behavior in various familiar settings.

b. Use and understand the meaning of appropriate gestures and oral expressions of everyday interactions of the language and cultures studied. E7.4c

c. Perform age-appropriate cultural activities, such as games, songs, birthday celebrations, storytelling, and dramatizations, in the language studied. E8.4d; H32.4cd

By the end of grade 8:

a. Observe, analyze, and discuss patterns of behavior typical of their peer group and their sources in the culture studied. A10.8c; S28.8b

b. Use and understand the meaning of appropriate verbal and non-verbal behavior for daily activities among peers and adults in the language and cultures studied. S28.5b

c. Understand age-appropriate cultural practices, such as games (e.g., role of leader and taking turns), sports, and entertainment (e.g., music, dance, and drama), in the language studied. G6.8f

By the end of grade 12:

a. Identify, analyze, and discuss various typical patterns of behavior or interaction and their sources in the cultures studied. S28.12adef

b. Identify, examine, and discuss connections between socially approved behavioral patterns and cultural perspectives. S28.12adef

c. Understand and follow cultural patterns of communication and behavior typical of peers or adults in the cultures studied. S28.12df

5. Students will demonstrate an understanding of the products and perspectives of the cultures studied and the relationship between them.

By the end of grade 4:

a. Identify and describe tangible cultural products such as toys, clothing, types of dwellings, and foods.

b. Be familiar with expressive cultural products such as children's songs, selections from children's literature, and types of artwork enjoyed or produced by their peer group in the cultures studied. A17.4b; E3.4ad; G9.4c; H32.4ag

c. Identify and discuss artwork, crafts, or media products enjoyed or made by their peer group within the cultures studied. H32.4c

d. Recognize themes, ideas, or perspectives of the culture. E3.4d; G9.4b; G6.4e

By the end of grade 8:

a. Identify, discuss, and analyze themes, ideas, and perspectives of the cultures studied that are related to the production and perception of cultural products. A14.8a; E3.8g

b. Search for, identify, and investigate the function of utilitarian products (e.g., sports equipment, household items, tools, foods, and clothing) of the culture studied as found within their homes and communities.

c. Describe the effects of expressive cultural products (e.g., stories, poetry, music, paintings, dance, and drama) on the cultures studied. A17.8c; A17.8f; A1.8b; E3.8g

By the end of grade 12:

a. Identify, discuss, and analyze the various social, economic, religious, and political institutions of the cultures studied, and analyze relationships among these institutions and the perspectives of the culture. C1.12b; S28.12e

b. Discuss and analyze expressive products of the culture, including selections from various literary genres and the fine arts. A17.12e; A14.12c; E3.12g

c. Identify, analyze, and evaluate the relationship between themes, ideas, and perspectives of the cultures studied and their literary and artistic products. A14.12c; A17.12f; E3.12g

6. Students will use the foreign language to increase their knowledge of other disciplines.

By the end of grade 4:

a. Use the language studied to demonstrate an understanding of concepts learned in other subject areas in the language studied, such as weather, math facts, measurements, animals, insects, or geographical concepts.

By the end of grade 8:

a. Use the language studied to discuss topics from other school subjects, including geographical terms and concepts, historical facts and concepts, mathematical terms and problems, and scientific information.

b. Comprehend articles or short videos on topics from other classes in the language studied.

c. Use the language studied to present written and oral reports on topics studied in other classes.

By the end of grade 12:

a. Discuss topics from other school subjects in the language studied, including political and historical concepts, worldwide health issues, and environmental concerns.

b. Acquire information from a variety of sources written in the language studied about a topic from other school subjects.

7. Students will understand the elements of language and culture studied that can only be comprehended in the original.

By the end of grade 4:

a. Understand words and ideas that can only be grasped through the original language and cultures.

By the end of grade 8:

a. Understand ideas and viewpoints that can only be explained in terms of the original language and culture.

By the end of grade 12:

a. Understand the relationships between untranslatable concepts and words (or phrases) and the culture from which they have arisen.

COMPARISONS

8. Students will demonstrate an understanding of the nature of language through comparisons of the language studied and their own.

By the end of grade 4:

a. Cite and use examples of words that are borrowed in the language they are learning and in their own, and offer explanations about why languages in general might need to borrow words. E1.4acd

b. Explain how cognates enhance comprehension of spoken and written language and identify commonly occurring cognates in their native language and the language they are learning. E1.4cd

c. Identify idiomatic expressions in both their native language and the language being learned and describe how idiomatic expressions work in general. E1.4b

d. Identify and use formal and informal forms of language and expressions of politeness in other languages and their own.

e. Describe differences and similarities between the sound and writing systems of their own language and the language being learned.

f. Understand the various ways of expressing ideas both in their own language and the language being learned.

By the end of grade 8:

a. Understand the category of grammatical gender in languages and use it in their spoken and written language.

b. Discuss the relationship among languages, based on their awareness of cognates and similarity of idioms. E1.8ab

c. Communicate status differences in their own language and the language they are learning.

d. Understand that languages have critical sound distinctions that must be mastered in order to communicate meaning.

GRADE 12

By the end of grade 12:

a. Understand that cognates have the same as well as different meanings among languages and explain the significance of this for understanding the evolution of language. E1.12ab

b. Analyze time and tense elements of the language studied and comparable linguistic elements in the native language, and conjecture about how languages use forms to express time and tense relationships.

c. Understand the relationship between word order and meaning and explain how this may or may not reflect the ways in which cultures organize information and view the world.

d. Compare and contrast the writing system of the language studied and their own and describe the nature of those writing systems (e.g., logographic, syllabic, alphabetic).

COMPARISONS

9. Students will demonstrate an understanding of the concept of culture through comparisons of the cultures studied and their own.

By the end of grade 4:

a. Compare simple patterns of behavior or interaction in various settings in the culture studied and their own.

b. Compare gestures and their meaning in the culture studied and their own. E7.4i

c. Compare material products (e.g., toys, sports equipment, or food) of the cultures studied and their own.

d. Compare intangible products (e.g., rhymes, songs, or folktales) of the cultures studied and their own. A17.4c

By the end of grade 8:

a. Compare verbal and nonverbal behavior within particular activities in the cultures studied and their own. S28.12df

b. Identify the cultural features of daily life through comparisons between the culture studied and their own. G9.8d; S28

c. Analyze why certain products originate in or are important to particular cultures by considering selected products from the cultures studied and their own.

d. Hypothesize about the general relationship between cultural perspectives and practices (e.g., holidays, celebrations, work habits, or play) by analyzing selected practices from the cultures studied and their own. C4.8ab

e. Hypothesize about the general relationship between cultural perspectives and expressive products (e.g., music, visual arts, or appropriate forms of literature) by analyzing selected products from the cultures studied and their own. A1.8c; A17.4b and 8c; E3.8g

GRADE 12

By the end of grade 12:

a. Hypothesize about the origins of idiom as a reflection of culture, examples from the language and cultures being studied and their own.

b. Compare nuances of meaning of words, idioms, and vocal inflections in the language studied and their own.

c. Analyze the relationship of perspectives and practices in the cultures studied and compare these with their own to draw general conclusions about the mutual influence between perspectives and practices. C13.12ab

d. Analyze the relationship between the products and perspectives in the cultures studied and compare these with their own to draw conclusions about the mutual influence between perspectives and products. E3.12g

Geography Standards

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Geography Standards Introduction

Geography is a much richer field of study than might be imagined in the recollection of youthful memorization of capitals; the identification of oceans, rivers, and mountain ranges; and the definition of plateau, delta, and tundra. Knowing these things is important, but such knowledge by itself is not enough to answer four questions essential to understanding the world and our place in it: Where is something located? Why is it there? How did it get there? How does it interact with other things and other places?

Geography is the study of people, places, and environments. Rather than studying each of these concepts individually, students of geography analyze the earth's surface and the processes that shape it, the relationships between people and environments, and the connections between people and places.

Students today must grasp the consequences of a growing population and a competitive, global economy on the earth. Students need this understanding for the very practical reason that technology, economics, and politics connect us to virtually every person and place on the planet. With a strong grasp of geography, students are better equipped to find improved ways to handle their local problems and to appreciate the global implications of all human activities—their own and those of other people.

Students also need to use geographical knowledge and skills for an ethical reason: The earth will continue to whirl through space long after we are gone, but it may not continue to exist in a condition in which humans can thrive or even live. Life in general and humans in particular are fragile. Geography provides knowledge of earth's physical and human systems, how living things and physical environments affect one another, and the importance and needs of ecosystems. In this way, students come to know about the needs and fragility of ecosystems. When used judiciously, this geographical knowledge provides a basis for humans to cooperate in the best interests of our planet and future generations.

Finally, students should learn geography simply because it captures the imagination. It stimulates curiosity about the world and the world's diverse inhabitants and places, as well as about local, regional, and global issues. By understanding our place in the world, we learn to understand and appreciate other cultures and locations. Geography focuses attention on exciting and interesting concepts, on fascinating people and places, on matters worth knowing. Not only is the knowledge of geography absorbing, it helps people make better-informed, and therefore wiser, decisions.

Geography Standards Introduction

The Standards for Excellence in Education (SEE) geography standards describe the skills and knowledge that students must have to make and apply sound decisions and to appreciate the geography of the world around them. There are fourteen SEE geography standards presented with benchmarks for the fourth, eighth, and twelfth grades. The first five standards describe the skills that all students should have in order to think geographically; the remaining nine standards are the concepts that all students should know.

As with other subjects, it is important to note that the skills and concepts should not be learned or taught as discrete items. They are presented separately here to emphasize that both skills and knowledge are important and to simplify reading and comprehension of the standards.

CBE adapted the geography standards from *Geography for Life: National Geography Standards*, 1994, published in Washington, DC, by the National Geographic Society.

Geography for Life: National Geography Standards, 1994, may be obtained by calling the National Council for Geographic Education at 412-357-6290.

GEOGRAPHIC SKILLS

1. Students will ask geographic questions.

By the end of grade 4:

a. Ask geographic questions: Where is it located? Why is it there? What is significant about its location? How is its location related to the locations of other people, places, and environments? H2.12b; S1.2a; S5.5a

b. Distinguish between geographic and nongeographic questions.

By the end of grade 8:

a. Identify geographic issues, define geographic problems, and pose geographic questions.

b. Identify the research components of geographic questions. M6.8ae; M7.8ac; M10.8b

By the end of grade 12:

a. Plan and organize a geographic research project (e.g., specify a problem, pose a research question or hypothesis, and identify data sources). E4.12f; M10.12a

2. Students will use geographic representations, concepts, and technologies to acquire geographic information.

By the end of grade 4:

a. Identify and describe the characteristics and purposes of geographic representations, tools, and technologies (e.g., maps, globes, graphs, diagrams, aerial and other photographs, almanacs, statistical abstracts). M1.3c

b. Identify major physical and human features on a variety of scales (local to global), using maps, globes, and other sources of graphic information. H2.12c

c. Identify the location of the earth's continents and oceans in relation to each other and to lines of longitude and latitude (e.g., the equator and the prime meridian).

d. Identify the location of major physical and human features in the United States and on earth.

e. Gather information from a variety of primary and secondary sources, including maps. E4.4fgh; M6.3a and 5b

f. Make and record observations about the physical and human characteristics of places. M3.3a; M6.3a; M7.3c; S1.5a

By the end of grade 8:

a. Describe the essential characteristics (e.g., scale, directional indicators, and symbols) and functions of maps and geographic representations, tools, and technologies.

b. Develop and use different kinds of maps, globes, graphs, charts, databases, and models to collect geographic information. S4.5b

c. Identify the place of origin of culture groups; the largest urban areas in the United States; and major ocean currents, wind patterns, landforms, and climate regions on maps and globes.

d. Systematically observe and record the physical and human characteristics of places on the basis of fieldwork.

By the end of grade 12:

a. Systematically gather geographic information from a variety of primary and secondary sources. H2.12c; H4.12df

b. Evaluate the applications of geographic tools and supporting technologies to serve geographic purposes. H2.12c

GEOGRAPHIC SKILLS

3. Students will use geographic representations, concepts, and technologies to organize geographic information.

By the end of grade 4:

a. Prepare maps, graphs, tables, and diagrams to display geographic information. M6.3b and 5a; M10.3c

b. Use the concepts of location, distance, direction, scale, movement, interaction, and region to describe the spatial organization of places and environments. M1.3c; M3.3b; M5.5a

By the end of grade 8:

a. Prepare various forms of maps, graphs, diagrams, tables, and charts to organize and display geographic information. M6.8ac

b. Integrate various types of materials to organize geographic information. H4.12f

By the end of grade 12:

a. Select and design appropriate forms of maps, graphs, diagrams, tables, and charts to organize geographic information. M10.12c

b. Use a variety of media to develop and organize integrated summaries of geographic information. M7.12a; M10.12ac

4. Students will analyze geographic information about the spatial organization of people, places, and environments on the earth's surface.

By the end of grade 4:

a. Analyze patterns on the earth's surface in terms of spatial elements, such as point, line, area, and volume. M3.3ab and 5b; M5.5a

b. Use maps, tables, graphs, texts, photographs, and documents to interpret geographic patterns, trends, and relationships. H2.12c; M6.5b

c. Use simple mathematics to analyze geographic data.

By the end of grade 8:

a. Interpret, analyze, and synthesize information obtained from a variety of sources—maps, graphs, charts, tables, diagrams, texts, photographs, documents, and interviews. M6.8a

b. Evaluate the relative merits of maps and other geographic representations, tools, and technologies in terms of their value in solving geographic questions (e.g., the merits of using different map projections for specific purposes).

c. Use statistics and other quantitative techniques to evaluate geographic information. M3.8a; M4.8bd; M8.8a

d. Analyze patterns of land use in urban, suburban, and rural areas in terms of ideas such as distance, accessibility, and connections. S25.8c

e. Analyze how geographic features and human population patterns affect the use of land.

By the end of grade 12:

a. Use spatial models to explain relationships between places and patterns of settlement and trade.

b. Apply concepts and models of spatial organization and explain how people value and use space to make decisions. H14.12abcd; H19.12bcd; H20.12a; H22.12b

c. Synthesize, interpret, and evaluate geographic information from a variety of sources.

d. Use quantitative methods of analysis to interpret geographic information. M6.12e

GEOGRAPHIC SKILLS

5. Students will answer geographic questions and communicate the answers in a number of ways.

By the end of grade 4:

a. Identify the locations of places and their spatial relationship from memory.

b. Present geographic information both orally and in written reports accompanied by maps and graphics. E5.4c

c. Draw conclusions and make geographic generalizations using methods of geographic inquiry.

d. Solve geographic problems and make reasoned decisions using geographic generalizations.

By the end of grade 8:

a. Answer questions about the locations of physical and human features by sketching and describing an accurate map from memory.

b. Combine geographic information from multiple sources to answer geographic questions in a number of ways (e.g., use of maps, graphs, diagrams, videos, and pictures).

c. Judge the validity of geographic generalizations.

d. Use geographic tools and technologies to answer questions about spatial distributions and patterns on Earth. H4.12d

By the end of grade 12:

a. Answer geographic questions using sketch maps drawn from memory.

b. Make valid generalizations from various processes of geographic inquiry.

c. Present geographic information in a number of ways (e.g., oral and written presentations, and visual display).

d. Use maps and other geographic representations to present and suggest solutions to current world problems. C1.12c; H5.12c

6. Students will understand the human and physical characteristics of places and regions.

By the end of grade 4:

a. Describe and compare the human and physical characteristics of places at a variety of scales, local to global. S10.8b

b. Describe the human and physical processes that shape the characteristics of places. H3.12d; H5.12b; S11.5a; S30.2b and 5d; S31.5ae

c. Define and compare regions using their human and physical characteristics.

d. Describe changes in the human and physical characteristics of regions that occur over time and identify the consequences of those changes. H3.12d; S11.5a; S30.5bd; S31.5ae

e. Describe and compare different perspectives that different people have of the same places and regions. F5.4b; H3.12b

By the end of grade 8:

a. Analyze the human and physical characteristics of places and regions to determine the processes that contribute to their evolution. H3.12d; S10.8def; S11.8ab

b. Analyze how various uses of technology have shaped and continue to shape the physical and human characteristics of places. H3.12d; S29.8a; S30.8a

c. Develop and use criteria to define various types of regions.

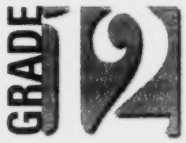
d. Explain how events and conditions in one region might affect other regions in the area and across the world. C1.8b; C13.8abc; F2.12b; H3.12de; S10.8df; S31.8b

e. Illustrate and explain how places and regions serve as cultural symbols (e.g., Wall Street as a symbol for finance, the Golden Gate Bridge as a symbol for San Francisco). A14.12c

f. Describe how cultures influence the characteristics and defining features of regions. F4.4c

g. Explain how cultural groups perceive and use places and regions on the earth's surface and the effects of technology on their use of these places and regions. S30.8d

PLACE AND REGIONS



By the end of grade 12:

a. Describe the same place at different times in its history (e.g., London as a Roman outpost in Britain, as a medieval trading center, and as the seat of a global empire in the nineteenth century) and from different perspectives (e.g., London as seen by people from Great Britain and as seen by people from the United States). A14.12c

b. Explain how social, cultural, and economic activities shape the features of places and regions.

c. Describe the changing criteria that can be used to define a region and explain the different types and structures of regional systems. H3.12d

d. Analyze the connections within and among the parts of a regional system. S31.12a

e. Use the geographical concept of regions to analyze historical issues and questions. C1.12b; H3.12b

f. Explain why places and regions are important to individual human identity and as symbols for unifying or fragmenting society (e.g., Jerusalem as a holy city for Christians, Jews, and Muslims).

7. Students will understand the physical processes that shape and change the patterns of the earth's surface.

By the end of grade 4:

a. Identify and describe the physical components of the earth's atmosphere, lithosphere, hydrosphere, and biosphere. S10.5d and 8a

b. Describe how the earth's position relative to the sun affects events and conditions on Earth. S10.2b, 5b, and 8b

c. Explain how physical processes (e.g., volcanoes, earthquakes, and erosion) help to shape geographical features and their patterns on the earth's surface. S11.2b and 5ab

By the end of grade 8:

a. Analyze the physical processes that contribute to the evolution of place. S11.8abce

b. Explain how physical processes produce patterns in the physical environment. S11.8abcde

c. Predict the consequences of a specific physical process (e.g., erosion, ocean currents) operating on the earth's surface. S11.8abcd

d. Explain how the relationship of the earth to the sun affects physical processes and patterns. S10.8bef

By the end of grade 12:

a. Describe how physical processes affect different regions of the United States and the world. 11.12cdef

b. Explain physical processes, patterns, and cycles and describe the ways in which physical processes are dynamic and interactive. S11.12cdef

c. Analyze the interactions resulting from the relationship of earth to sun. S10.12b

PHYSICAL SYSTEMS

8. Students will understand the characteristics and spatial distribution of ecosystems on the earth's surface.

By the end of grade 4:

a. Describe and illustrate the components of ecosystems at a variety of scales. S19.5abd

b. Describe and illustrate the distribution and patterns of ecosystems. S19.2b

c. Describe and illustrate how humans interact with ecosystems. S31.5ac

By the end of grade 8:

a. Explain the distribution of ecosystems from local to global scales. S19.8a; S20.8c

b. Explain how ecosystems function and undergo change. S19.12ab; S20.8a; S21.8a

c. Explain how human processes contribute to changes in ecosystems. S20.12ab; S31.5a

By the end of grade 12:

a. Analyze the distribution of ecosystems by examining relationships among soil, climate, and plant and animal life. S20.12bc

b. Analyze the biodiversity and productivity of ecosystems. S20.12bc

c. Understand and consider solutions to environmental problems using the concept of ecosystems. S30.12d; S31.12c; S32.12c

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9. Students will understand the demographic and cultural characteristics of human populations on the earth's surface.

By the end of grade 4:

a. Describe the spatial distribution of populations.

b. Describe and compare the characteristics of populations (e.g., ethnicity, age distribution, and male and female) at a variety of scales.

c. Identify and compare the cultural characteristics of different regions and people. A17.4bc; F5.4b; H9.4b; H15.4a

d. Describe changes in cultures over time.

By the end of grade 8:

a. Use key demographic concepts to analyze the structure and characteristics of different populations and population patterns over time. H6.12a; H31.12d; H32.12a; H47.12a; H59.12a; M6.8abd

b. Identify ways in which communities reflect the cultural background of their inhabitants, including immigrant populations. A17.8cf; F9.8b; H15.4a; H20.12a; H35.12a; H36.12a; H53.12b

By the end of grade 12:

a. Explain how the physical environment contributes to the development of distinct cultural identities.

b. Explain why places and regions are important to people's identity (on the basis of stage of life, gender, social class, ethnicity, values, and belief systems) as symbols for unifying or fragmenting society.

c. Explain how technology contributes to both the spread of culture and the preservation of cultural separateness. S30.8a and 12a

d. Explain how cultural features often define regions (e.g., the effects of early Spanish settlement in the southwestern United States, the impact of Buddhism in shaping social attitudes in Southeast Asia).

e. Predict trends in the spatial distribution of population on the earth, analyze population issues, and propose policies to address such issues. M6.12e; M7.12a

HUMAN SYSTEMS

10. Students will understand the migration and settlement of human populations on the earth's surface.

GRADE 4

By the end of grade 4:

a. Describe the causes and effects of human migration.

b. Describe and explain various types of settlement and patterns of land use. H14.4ab; H33.12a

c. Explain patterns of settlement over time and suggest why particular locations are used for certain human activities. H8.4a; H19.4a; H33.12ab; S10.8b; S19.5d

GRADE 8

By the end of grade 8:

a. Describe the patterns and processes of migration and diffusion. H19.12b; H26.4b; H46.12b

b. Describe how human migration influences the character of a place. H35.12a; H36.12a

c. Describe the reasons for and consequences of various settlement patterns.

d. Describe the ways in which both the landscape and society would change as a consequence of shifting from a dispersed (e.g., rural) to a concentrated (e.g., urban) settlement form. H35.12c; H42.12b; S31.8a

e. Describe the accessibility, interdependence, and patterns of settlement of places (such as cities). S31.8bc

f. Describe how cities function and are structured. C8.8d; H19.12b; H32.12b

GRADE 12

By the end of grade 12:

a. Identify the ways beliefs about geographic features influence people's decisions about location, settlement, and public policy.

b. Evaluate the impact of human migration on physical and human systems. H20.12a; H25.12a; H31.12d; S31.12a

c. Explain how history has been affected by movements of people and goods. H20.12a; H25.12a; H35.12a; H42.12d; H44.12a; H46.12a

d. Compare the characteristics of settlements in developing and developed countries. H32.12ab

e. Evaluate the physical and human impacts of emerging urban forms in the present-day world. S31.12ac

11. Students will understand the patterns and networks of economic interdependence on the earth's surface.

By the end of grade 4:

a. Locate and classify economic activities, explaining how people in different parts of the world earn their living.

b. Identify factors important in the location of economic activities. S30.5bc; S31.5b

c. Identify the modes of transportation and communication used to move people, products, and ideas from place to place. S30.5bc; S31.5b

By the end of grade 8:

a. List and define the major terms used to describe economic activity in a geographic context.

b. Analyze and evaluate issues related to the spatial distribution of economic activities, both historically and in contemporary times. S31.8b; S32.8c

c. Identify and explain the geographic factors influencing industrial location in the United States. H19.12cd; H27.12c; S10.8b; S32.8c

d. Identify and explain the primary geographic causes for world trade. H32.12d; H35.12c; H36.12a; H38.12d; H40.12b; H44.12b; H46.12c; H50.12b; H53.12c

e. Compare and evaluate the roles of historical and contemporary systems of transportation and communication in the development of economic activities. H15.12a; H28.12c; H53.12b; S30.8a; S31.8bc

By the end of grade 12:

a. Classify and describe the spatial distribution of major economic systems and evaluate their relative merits in terms of productivity and the social welfare of workers. C3.12a; H32.12e

b. Analyze how location and distance influence economic systems at local, national, and international levels.

c. Identify and analyze the historical movement patterns of people and goods and their relationships to economic activity. H6.12a; H32.12d; H38.12d; H40.12b

d. Analyze and evaluate international economic issues from a spatial point of view.

HUMAN SYSTEMS

12. Students will understand how the forces of cooperation and conflict among people influence the division and control of the earth's surface.

By the end of grade 4:

a. Identify and describe types of political and territorial units at different scales. C10.4a

b. Explain how and why people compete for control of the earth's surface. C10.4b

c. Analyze current events as examples of cooperation, conflict, or both. C10.4b

By the end of grade 8:

a. Identify and explain reasons for the different spatial divisions (e.g., school district, city, county, state) in which the student lives.

b. Explain why people cooperate but also engage in conflict to control the earth's surface. C6.8e; C10.8bc; H35.12b; H36.12a; H37.12cd; H38.12bd; H41.12a; H42.12ade; H44.12a; H46.12b; H47.12c; H48.12abcd; H49.12ab; H52.12d; H53.12acdf; H54.12b

c. Describe the factors that affect the cohesiveness and integration of countries. C1.8b; C6.8e; H56.12b

By the end of grade 12:

a. Analyze how cooperation and conflict influence the development and control of social, political, and economic entities (e.g., districts, regions, countries, cultures) on earth. C6.12e; C10.12c; H12.12a; H17.12a; H22.12b; H37.12d; H55.12b

b. Explain the changes that occur in the spatial extent and organizational structure of social, political, and economic organizations (e.g., the Roman Empire, Han Dynasty, United Nations, NATO). C1.12b; C6.12e; H38.12b; H39.12a; H58.12d; H59.12c

c. Explain how external forces can conflict economically and politically with internal interests in a region. C10.12b; H12.12a; H17.12ac; H42.12a

d. Analyze the role that culture plays in incidents of cooperation and conflict in the present-day world. C6.12be

e. Investigate how transregional alliances and multinational organizations can encourage or discourage cultural solidarity. C10.12c; H58.12d

13. Students will understand how human actions modify the physical environment and how physical systems affect human activity and living conditions.

By the end of grade 4:

a. Describe ways in which people depend on the physical environment. S31.2ac and 5c; S32.2a and 5ab

b. Identify ways in which humans adapt to and alter the physical environment. S30.5bcd; S31.2b and 5ae

c. Describe and locate natural hazards in the physical environment.

By the end of grade 8:

a. Identify and explain how changes people make in the physical environment in one place can cause changes in other places. S32.8d

b. Analyze the ways in which technology influences human capacity to modify the physical environment and identify the consequences of the modifications. S30.8a

c. Analyze ways in which human activity and living conditions are developed in response to the physical environment. S30.8b

d. Analyze the effects of physical and human geographic factors on major historical events.

By the end of grade 12:

a. Explain the global impacts of human changes in the physical environment. S30.12d

b. Develop possible solutions to environmental problems caused by human modification of the physical environment. S30.12c

c. Analyze how changes in the physical environment can reduce the environment's capacity to support human activity. S18.12f; S20.12b

d. Analyze the ways in which changing technology has expanded the human capability to modify the physical environment. S30.12d

e. Suggest ways to adapt to or overcome the limits imposed by physical systems on human activity and living conditions. S30.12bc

f. Explain the ways individuals and societies prepare for and react to natural hazards in different environments.

ENVIRONMENT AND SOCIETY

14. Students will understand the changes that occur in the meaning, use, distribution, and importance of resources.

By the end of grade 4:

a. Locate and differentiate between renewable, nonrenewable, and flow resources. S32.2a and 5ab

b. Describe the meaning and use of resources in the student's daily life. S32.2a and 5ac

c. Explain the relationships between the locations of resources and patterns of population distribution.

d. Identify and describe critical present-day issues related to the use of resources. S32.5c

e. Identify the ways in which resources can be reused and recycled. S32.5c

By the end of grade 8:

a. Describe and analyze world patterns of resource distribution and use. S32.8abc

b. Compare different viewpoints regarding the consequences of the use of resources in the contemporary world. E2.8bc; E5.8c

c. Identify the role of technology in resource acquisition and use.

d. Describe processes that produce renewable and nonrenewable resources, and develop plans for the management and use of renewable, nonrenewable, and flow resources. S20.12ac; S32.8d

e. Explain the importance of energy resources to the development of human societies. S32.8c

ENVIRONMENT AND SOCIETY

By the end of grade 12:

a. Explain the relationship between settlement, exploration, and colonization and resources. H7.12ab; H8.12a; H46.12bd; H48.12d; H53.12d

b. Analyze policy decisions regarding the use of resources in different regions of the world. S32.12bcd

c. Research policies and programs related to the use and recycling of resources at different spatial scales. S32.12bcd

d. Develop policies that are designed to guide the use and management of earth's resources and that take into account the various interests involved. S32.12bcd

History Standards

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History Standards Introduction

It has often been said that we should study history to avoid repeating the mistakes of the past. That is a substantial enough reason by itself (though we could argue over how effectively humans have used the lessons of the past), but there are others just as compelling. In the introductory essay for the national history standards, from which the SEE standards have been drawn, the authors wrote, "Without history, a society shares no common memory of where it has been, of what its core values are, or of what decisions of the past account for present circumstances." History is one of the keys to developing an awareness of who we are. We study history to discover and understand our roots in the past, to learn to make wiser choices in the here and now, and to understand ourselves as humans and as people of a nation. We study history because the stories are fascinating. Properly taught, history brings life out of the dust of our streets, turns them into places where important things happened, and gives us a place in an enormous and exciting saga.

As we learn history, we come to understand how and why civilizations arose when and where they did, which helps us understand the very nature of civilization. As the story of developing civilizations unfolds, we discover the factors that led to increased interactions among societies and the effects, for good or for ill, of those interactions. Why did Mesopotamia develop as it did? Were the influences of geography and climate more significant then than they are now? How were some Asian rulers able to maintain power over vast empires despite the lack of modern means of communications? How has more recent history been influenced by technological advances? Have these advances changed the way civilizations rise and fall?

To know history is to have the foundation needed to build an understanding of the issues of society today. The modern wars in Ireland or the former Yugoslavia, for instance, are deeply rooted in ancient and continuous provocations and conflicts that color every decision, and every perception of decisions, made now. The diversity and glorious creativity of various empires on the Indian subcontinent evoke respect for its civilization and provide a framework for comprehending the difficulties in gathering so many different people into one coherent nation. A knowledge of the ancient and far-reaching roots of slavery helps us to realize that its awful legacy is not limited to the United States, but is felt worldwide. In this way, a

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foundation in historical knowledge can lead not only to an intellectual understanding of how today's issues came to be, but also may engender compassion.

Students should learn that knowledge of history need not be accompanied by either approval or acceptance of events. To understand that conditions, norms, and laws were different in the past does not mean that we must accept that the results of those conditions were good and just. It does, however, mean that we can better understand why life was not as it is now. This means that students must learn not only the history of military affairs and rulers, of politicians and economists, but also about what life was like for various classes, for both genders, in different times and places. Life for a freeborn woman in ancient Greece was not like life for a male slave; conditions for homesteaders in Nebraska did not match those for merchants in mid-nineteenth-century Boston.

There is no shortage of interesting and worthy content for historical study. History teachers sometimes joke that every day that passes means another day of material to cover. In developing standards for history, then, there is a need to glean what is most important, which is not always what students have traditionally been expected to learn. Asian, African, and South American societies have often been mere sidebars in history instruction, yet they each have a rich and vital story of their own. It is the same with the stories of the poor, of women, and of groups who were the minority in their homeland. Besides these stories, and the more traditional (and still essential) stories of conquerors and major events, students need to learn to see large patterns across time and understand how the fabric of daily life in various places and times was as interesting and often as significant as single remarkable events.

Students should have the chance to develop a thorough grounding in U.S. history to learn how the country they live in became what it is today. The American story is one of dramatic and often controversial change. Students should have an opportunity to learn the fascinating and complex stories of the pilgrims and pioneers and politicians, the entrepreneurs, the dreamers, and the ordinary citizens who in a few centuries brought our nation to a position of nearly worldwide respect.

History Standards Introduction

Students should also be expected to know, in relatively broad terms, the history of the world—both because it anchors the United States in a larger time and space and because it is important in its own right. We gain perspective by seeing our place in the whole, and we gain an appreciation for the magnificent societies that have at other times dominated the events of the world or left a legacy of arts and letters, scientific thought and discovery, philosophy, government, economic models, religions. Such an understanding promotes both humility and pride.

The SEE history standards outline what students need to know and be able to do to appreciate, understand, and use history wisely and with satisfaction. They guide students to a thoughtful knowledge of events around the globe and to events, both big and small, that shaped the United States. They set forth expectations of knowledge regarding how and why we as a nation, and simply as human beings, got to where we are now. They lead students to the sometimes neglected stories of old times, which are no less important for having been left aside in classrooms of another day.

This content by itself is not sufficient, however. Standards need to move students toward an acquisition of skills which will help them not to absorb history passively, but to think about it, judge it for its factualness and truth, gain greater understanding of the interconnectedness of circumstances, times, places, and events, and make sense of it all.

Thus, the SEE history standards are introduced by standards in historical thinking, which apply to all content, as appropriate. The historical content is organized into U.S. and world history standards that retain the national history standards' organization by eras, though some adjustments have been made. Since one of the greatest challenges to teaching and learning history is the sheer quantity of material to learn, great effort has been made to eliminate redundancies without making standards so broad or vague that they no longer make sense or provide direction.

The national standards for kindergarten through grade four were incorporated into the standards for U.S. history, but not into world history, since the myths and legends that form most students' early introduction to the world outside the United States are studied through the English language arts. The exception is four benchmarks found under the last world history standard, "World History Across the Ages." The remaining standards in both world and U.S. history are not divided into two sections,

one ending at grade eight, one at grade twelve, as in most of the other sections of this book. This is to accommodate the varying sequences of history instruction found across the United States.

The SEE history standards have been drawn from *National Standards for History, Basic Edition.* Even after CBE's efforts to distill them, they remain ambitious for their quantity. We believe—we hope—their content remains ambitious, as well. However, these standards are vital to our education as a nation, and every opportunity should be taken to ensure that students will be able to meet them.

National Standards for History, Basic Edition can be obtained by writing to

National Center for History in the Schools
University of California, Los Angeles
1100 Glendon Avenue, Suite 927
Box 951588
Los Angeles, CA 90095-1588
Fax: 310-794-6740

HISTORICAL THINKING SKILLS

1. Students will be able to think chronologically.

Grades K-12:

a. Distinguish between past, present, and future time.

b. Measure and calculate calendar time. M3.3ab

c. Create time lines; interpret data presented in time lines. M3.3b

d. Identify the temporal structure of an historical narrative or story, including student's own historical narratives. E2.4a

e. Compare alternative models for organizing history into periods.

2. Students will be able to comprehend a variety of historical resources.

Grades K-12:

a. Reconstruct the literal meaning of an historical passage. E2.4bf; E5.4d

b. Identify the central question(s) addressed by the historical narrative. E5.4d and 12d; E8.4bc and 12b; G1.4a

c. Use data in historical maps to analyze events and movements. E8.12b; G2.4b and 12ab; G4.4b; S12d

d. Use visual and mathematical data presented in charts, tables, pie and bar graphs, flow charts, Venn diagrams, and other graphic organizers to clarify, illustrate, or elaborate upon information presented in an historical narrative. S5.8c; M6.3c, 5b and 3a; M10.5a; E4.12d; E5.8c and 12d

e. Draw upon visual, literary, and musical sources to clarify, illustrate, or elaborate upon information presented in an historical narrative. E3.8c and 12egh; E88c

f. Analyze historical fiction; distinguish between fact and fiction. E2.12c

3. Students will be able to engage in historical analysis and interpretation.

Grades K-12:

a. Differentiate between historical facts and historical interpretations. S1.12a; E2.4f and 12c

b. Analyze historical events from more than one perspective. C1.8c and 12b; G6.12e; E5.12d; E8.12b

c. Compare and contrast differing sets of ideas, values, personalities, behaviors, and institutions in history. C1.8a; E3.4d, 8c, and 12eq

d. Identify major changes and stable patterns in societies and institutions. G5.12d; G6.4d; G6.8abd

e. Analyze cause-and-effect relationships and multiple causation, including the importance of the individual, the influence of ideas, and the role of chance in history. C1.8b; S1.12a; G6.8d

f. Compare and contrast competing historical narratives; evaluate major debates among historians. C1.8c and 12b; E2.4e, 8c, and 12f; E5.12d; E8.12b

g. Assess the credibility of a source of information. S1.12a; E2.12c; E5.8c and 12d; E8.12b

h. Discern and explain the bias of a source of information. S1.12a; E2.12e; E5.12d; E8.12b

i. Make historical comparisons across eras. C1.8a; E3.8c and 12eg

j. Make tentative interpretations and understand them as subject to revision in light of new information or perspectives. C1.8c and 12b; S1.12a; E2.4d

k. Distinguish between the perspective(s) of the time studied and later perspectives, including the present. E2.12e; E3.8g and 12eg; E5.12d; E8.12b

HISTORICAL THINKING SKILLS

4. Students will be able to conduct historical research.

Grades K-12:

a. Formulate historical questions to guide research. E4.12f; E5.12d

b. Identify the source of an historical document or narrative. E5.12d

c. Categorize historical information and organize it. E4.12g

d. Obtain historical data from multiple sources. G2.12a; G5.8d; E4.4fgh and 12f; E5.12d

e. Do quantitative analyses of historical data. M6.3c, 5ab, 3b and 8d; M6.12ace

f. Identify the gaps in the available records, gather contextual knowledge and perspectives of the time and place, and take these into account in the construction of a sound historical interpretation. G2.12a; G3.8b; E4.12c; E5.12d

5. Students will be able to engage in historical issues analysis and decision making.

Grades K-12:

a. Identify issues and problems in the past.

b. Marshal evidence of relevant antecedent circumstances and contemporaneous factors contributing to problems and evaluate alternative courses of action.

c. Formulate a position or course of action on an issue of the present day or the past based on historical data. G5.12d

d. Evaluate the implementation of a decision with historical consequences. C1.12bc

6. Students will understand comparative characteristics of societies in the Americas, Western Europe, and Western Africa that increasingly interacted after 1450.

By the end of grade 4:

a. The oral traditions, songs, art, community celebrations, language, and food of selected societies in Africa, the Americas, and Europe. E3.4d

b. The stories and adventures of early explorers and world travelers such as Eric the Red, Marco Polo, Zheng He, Ibn Battuta, and Christopher Columbus.

By the end of grade 12:

a. Political, economic, and cultural changes in Western European, Western African, and Pre-Colombian American societies in the age of exploration. G11.12c

b. The differences and similarities in the political and economic systems, social organizations, and the dominant ideas and values among Africans, Europeans, and Native Americans who converged in the western hemisphere after 1492.

7. Students will understand how early European exploration and colonization resulted in cultural and ecological interactions among previously unconnected people.

By the end of grade 4:

a. The ways the family, churches and synagogues, music, and crafts were used to pass along the beliefs and values of various groups. A17.12c; A17.4bc

b. The legends and myths of early European, African, and Asian-Pacific explorers and settlers. E3.4a

By the end of grade 12:

a. The broad outline of the stages of European oceanic and overland exploration, amid international rivalries, from the ninth to seventeenth centuries in North America. G14.12a

b. The course of the Spanish and Portuguese conquest of the Americas and its effect on the native peoples. G14.12a

UNITED STATES HISTORY

Era 2: Colonization and Settlement (1585-1763)

8. Students will understand why the Americas attracted Europeans and how Europeans struggled for control of North America and the Caribbean.

By the end of grade 4:

a. Biographies, legends, and myths that tell the story of why the first European, African, and Asian-Pacific explorers, settlers, and slaves came to the local community, state, or region. E3.4a; G10.4c

b. Why we celebrate Thanksgiving Day.

By the end of grade 12:

a. Why diverse European immigrants came to America. G14.12a

b. The European struggle for control of North America, including the interactions among Native Americans and the European settlers, how Native American society changed as a result of the settlements, the Seven Years' War, and Native American involvement in colonial wars.

9. Students will understand how political, religious, and social institutions emerged in colonial America.

By the end of grade 4:

a. The stories of family life in colonial America told through early records, diaries, and artifacts.

b. How colonial communities in North America were similar and different in terms of politics, religion, and social customs. G9.4c

c. Folk heroes, stories, songs, legends, tall tales, and other cultural contributions from various regions and how they helped to form a national heritage. A17.12c; A17.4bc; E4.3ad

By the end of grade 12:

a. The roots of representative government and how political rights were defined. C4.12c; C5.12a

b. Religious diversity in the colonies and how ideas about religious freedom evolved.

c. Social and cultural change in colonial America, including how Enlightenment ideas influenced American society and influenced the creation of public education in New England colonies.

10. Students will understand how the values and institutions of European economic life took root in the colonies and how slavery reshaped the lives of Europeans and Africans in the Americas.

By the end of grade 4:

a. How economic development and the growth of slavery varied among communities in North America and influenced the local community, state, or region.

b. How transportation and communication affected life in colonial America. S30.5ab

By the end of grade 12:

a. Colonial economic life, including the influence of mercantilism, the Navigation Acts, regional differences, and labor systems in the Americas. C36.12a

b. The life of Africans under slavery in different regions of North America.

UNITED STATES HISTORY

Era 3: Revolution and the New Nation (1754-1820s)

11. Students will understand the causes of the American Revolution, the ideas and interests involved in forging the revolutionary movement, and the reasons for the American victory.

GRADE 4

By the end of grade 4:

a. How the Continental Congress was formed and how the nation's basic democratic principles were described in the Declaration of Independence. C1.4b; C6.8a

b. The stories and biographies of historic figures of the American Revolution, including George Washington, Samuel Adams, Thomas Paine, Patrick Henry, Benjamin Franklin, Betsy Ross, and Molly Pitcher. C1.4a

c. Revolutionary events and battles that symbolize fundamental values and principles of American democracy. C1.4b

d. Why we celebrate Independence Day. C1.4ab; C5.4a

e. Why George Washington is one of the presidents celebrated on Presidents' Day. C1.4a

GRADE 12

By the end of grade 12:

a. The political, ideological, religious, and economic causes of the American Revolution.

b. The principles expressed in the Declaration of Independence. C5.8ab

c. The factors affecting the course of the war and contributing to the American victory.

12. Students will understand the impact of the American Revolution on politics, the economy, and society.

By the end of grade 4:

a. Stories, folk tales, legends, and biographies that tell how the American Revolution affected the local community, state, or region. E3.4a

b. Symbols from the American Revolution through which American values and principles are expressed, such as the Liberty Bell and the national flag. C1.4a

By the end of grade 12:

a. The creation of governments at national and state levels during and immediately after the American Revolution. G12.12a

b. The economic issues arising out of the American Revolution, including the war debt, factors that led to Shay's Rebellion, dispute over western lands, and states' attempts to deal with trade, banking, and taxation.

c. The American Revolution's effects on different social groups.

UNITED STATES HISTORY

Era 3: Revolution and the New Nation (1754-1820s)

13. Students will understand the institutions and practices of government created during the American Revolution and how they were revised between 1787 and 1815 to create the foundation of the American political system based on the U.S. Constitution and the Bill of Rights.

By the end of grade 4:

a. The story of how the United States government was formed and the nation's basic democratic principles set forth in the Constitution and the Bill of Rights. C1.4b; C7.4a

b. Stories and biographies of historic figures who helped shape American democracy, including Thomas Jefferson, John Adams, James Madison, and Alexander Hamilton. C1.4a; C9.8a

By the end of grade 12:

a. The issues involved in the creation and ratification of the United States Constitution and the new government it established. C4.8c; C5.8ab; C7.12a

b. The guarantees of the Bill of Rights and its continuing significance. C3.8d; C4.8c; C5.8ab

c. The development of the Supreme Court's power and its significance from 1789 to 1820. C7.12bd

d. The development of the American party system.

14. Students will understand United States territorial expansion between 1801 and 1861 and how it affected relations with external powers and Native Americans.

By the end of grade 4:

a. Examples of how indigenous people, pioneers, and explorers interacted, studied through battle stories, the "Trail of Tears," folktales, and legends. G10.4b

b. The story of how and why the United States expanded westward, as told through oral tradition, photographs, diaries, artifacts, and newspaper accounts. G10.4b

By the end of grade 12:

a. The international background and consequences of the Louisiana Purchase, the War of 1812, and the Monroe Doctrine. G4.12b

b. Federal and state Indian policy and the strategies for survival forged by Native Americans. G4.12b

c. The ideology of Manifest Destiny, the nation's expansion to the Northwest, and the Mexican-American War. G4.12b

d. The causes and effects of large groups of people moving westward, including the settlement of the West. G4.12d; G9.12b

15. Students will understand how the Industrial Revolution, increasing immigration, and the rapid expansion of slavery changed the lives of Americans and led to regional tensions.

By the end of grade 4:

a. The ways communities and regions in North America were similar and different between 1801 and 1861. G9.4c and 8b

b. Biographies and stories of scientists and inventors during the early Industrial Revolution, such as Samuel Slater, Eli Whitney, and Robert Fulton. S8.5d

UNITED STATES HISTORY

Era 4: Expansion and Reform (1801-1861)

GRADE 12

By the end of grade 12:

a. How the factory system and the transportation and market revolutions shaped regional patterns of economic development. G11.8e; S30.8a

b. The first era of American urbanization.

c. How antebellum immigration changed American society.

d. The rapid growth of slavery after 1800 and the varied experiences of African Americans under "the peculiar institution."

16. Students will understand the sources and character of cultural, religious, and social reform movements and the extension, restriction, and reorganization of political democracy in the antebellum period.

GRADE 4

By the end of grade 4:

a. The people, such as Frederick Douglass, Henry Lloyd Garrison, Harriet Beecher Stowe, Harriet Tubman, Abraham Lincoln, Dorothea Dix, Charles G. Finney, and Richard Allen, who had a significant influence on cultural, religious, or social issues.

GRADE 12

By the end of grade 12:

a. The changing character of American political life in "the age of the common Man."

b. The abolitionist movement and how the debates over slavery influenced politics and sectionalism.

c. How Americans strove to reform society and create a distinct culture, including the Second Great Awakening, Transcendentalism, and the rise of public education.

d. Changing gender roles and the ideas and activities of women reformers.

17. Students will understand the causes, course, and character of the Civil War and its effects on the American people.

By the end of grade 4:

a. The various effects of the Civil War from region to region. C1.4b

b. Local, state, or national historic figures and heroes of the Civil War, including Lincoln and Lee. C1.4a

c. Why Abraham Lincoln is one of the presidents we celebrate on Presidents' Day. C1.4a

d. Why we celebrate Memorial Day. C1.4b

By the end of grade 12:

a. The economic, social, and cultural differences between the North and South and how politics, economic factors, and ideologies led to the Civil War. G11.12a; S30.8a

b. The course and turning points of the war and how political, military, and diplomatic leadership affected the outcome of the conflict.

c. How the human and material resources of the Union and Confederacy affected the course of the war. G11.12a; S30.8a

d. The social experience of the war on the battlefield and homefront.

18. Students will understand how various Reconstruction plans succeeded or failed.

By the end of grade 12:

a. The successes and failures of Reconstruction in the South, North, and West.

b. How Reconstruction programs transformed social relations in the South.

c. The political controversy over Reconstruction.

UNITED STATES HISTORY

Era 6: The Development of the Industrial United States (1870-1900)

19. Students will understand how the rise of corporations, heavy industry, and mechanized farming transformed American society and its people.

GRADE 4

By the end of grade 4:

a. How family life changed because of the Industrial Revolution. G10.4c

b. Biographies and stories of the major scientists and inventors of the later industrial revolution, including Alexander Graham Bell, Thomas Edison, and George Washington Carver. S8.5d

GRADE 12

By the end of grade 12:

a. The connections among industrialization, the advent of the modern corporation, and material well-being. S30.5abc and 8d; S31.12a

b. The rapid growth of cities and how urban life changed. G4.12b; G10.8a; G10.8f

c. How agriculture, mining, and ranching were transformed. G4.12b; G11.8c; S30.5c; S31.12a

d. The effects of rapid industrialization on the environment and the emergence of the first conservation movement.

20. Students will understand massive immigration after 1870 and how new social patterns, conflicts, and ideas of national unity developed amid growing cultural diversity.

GRADE 4

By the end of grade 4:

a. Stories about the experiences of immigrants from regions throughout the world who moved into the United States after 1870. C6.4bc; G9.8b

b. Folklore and other cultural contributions of immigrants to the United States and how they helped to form a national heritage. A17.4b; A17.4c

By the end of grade 12:

a. The size of various immigrant groups, their settlement patterns, and the nature of their entry into American society. G4.12b; G10.12bc

b. Scientific theories of race, race relations, and the struggle for equal rights.

c. How new cultural movements (e.g., Victorianism) at different social levels affected American life.

21. Students will understand the rise of the American labor movement and how political issues reflected social and economic changes.

By the end of grade 4:

a. How cities, farms, and families changed as work moved from farms to cities.

By the end of grade 12:

a. How the "second industrial revolution" changed the nature and conditions of work.

b. The rise of national labor unions and the role of state and federal governments in labor conflicts.

c. Populist and other responses to social and economic issues. C3.12a

22. Students will understand federal Indian policy and United States foreign policy after the Civil War.

By the end of grade 4:

a. The forced relocation of Native Americans and how their lives were affected.

By the end of grade 12:

a. Federal Indian policy, the reactions of different Native American societies, westward expansion, and the resulting struggles.

b. The roots and development of American expansionism and the causes and outcomes of the Spanish-American War. G4.12d

UNITED STATES HISTORY

Era 7: The Emergence of Modern America (1890-1930)

23. Students will understand how Progressives and others addressed problems of industrial capitalism, urbanization, and political corruption.

By the end of grade 4:

a. Why immigrants came to the United States from various countries and the conditions of their lives here.

By the end of grade 12:

a. The origins and formation of the Progressive movement and the positions Progressives advocated on issues at the local, state, and national levels.

b. The social and political interests of various groups during the Progressive movement, including women, African Americans, and Native Americans.

24. Students will understand the changing role of the United States in world affairs through World War I.

By the end of grade 4:

a. The participation of the United States in World War I. C1.4b

b. Why we celebrate Veterans' Day. C1.4b

By the end of grade 12:

a. American foreign policy strategies in the early twentieth century.

b. The causes of World War I and why the United States intervened after a period of neutrality, including the role of public opinion.

c. The impact at home and abroad of the United States' involvement in World War I, including the significance of the Russian Revolution and civil liberties controversies.

25. Students will understand how the United States changed from the end of World War I to the eve of the Great Depression.

By the end of grade 4:

a. How radio, movies, newspapers, and popular magazines created mass culture. A15.8a

By the end of grade 12:

a. Social tensions in the postwar era associated with radical political movements, immigration, religious fundamentalism, racism, and the women's rights movement. G10.12bc

b. How a modern capitalist economy emerged in the 1920s.

c. How cultural developments in education, media, leisure activities, and the arts reflected and changed American society.

d. Politics and international affairs in the 1920s, including the effects of women's suffrage on politics.

UNITED STATES HISTORY

Era 8: The Great Depression and World War II (1929-1945)

26. Students will understand the causes of the Great Depression, how it affected American society, and how the New Deal addressed the Great Depression, transformed American federalism, and initiated the welfare state.

By the end of grade 4:

a. The movements of large groups of people during the Great Depression, such as from the Dust Bowl to California.

b. The cultural contributions from various regions during the Great Depression. A17.4bc; G10.8a

By the end of grade 12:

a. The causes of the stock market crash of 1929 and the Great Depression.

b. How American life changed during the 1930s for factory workers, farmers, and families.

c. The policies and programs of the New Deal and its impact on society, including minorities, women, and the labor movement.

d. Opposition to the New Deal and the alternative programs of its detractors.

27. Students will understand the causes and course of World War II, the character of the war at home and abroad, and its reshaping of the United States' role in world affairs.

By the end of grade 4:

a. Historic figures of the World War II era, including Dwight Eisenhower and George Marshall. C1.4a

b. How participation in World War II influenced the development of the national identity. C1.4b

By the end of grade 12:

a. The causes and international background of World War II, including the rise of fascism, national socialism, and communism in the period between World War I and World War II.

b. The events of World War II and how the Allies prevailed. S30.8a

c. The effects of World War II at home, including technological and economic developments, civil rights, and cultural interactions. G11.8c; S30.8a

d. The effects of World War II on the United States' stature and role in world affairs.

UNITED STATES HISTORY

Era 9: Postwar United States (1945 to early 1970s)

28. Students will understand the economic boom and social transformation of the postwar United States.

GRADE 4

By the end of grade 4:

a. Major influences on society from the end of World War II to the early 1970s.

b. Biographies and stories of scientists, inventors, space explorers, and heroes of the period, including Jonas Salk, Charles Drew, John Glenn, and Neil Armstrong. S8.5d

GRADE 12

By the end of grade 12:

a. The extent and impact of economic changes in the postwar period, including the growth of the service, white-collar, and professional sectors of the economy and the gap between the poor and the increasingly affluent middle class.

b. How the various social changes of the postwar period, including the GI Bill, suburbanization, and the influence of popular culture, affected Americans.

c. How postwar science augmented the nation's economic strength, transformed daily life, and influenced the world economy. G11.8e; S30.5abc and 8ab

29. Students will understand how the Cold War and conflicts in Korea and Vietnam influenced domestic politics and foreign policy.

GRADE 12

By the end of grade 12:

a. The international origins and domestic consequences of the Cold War, including the advent of nuclear politics.

b. United States foreign policy toward Africa, Asia, the Middle East, and Latin America.

c. The foreign and domestic consequences of U.S. involvement in Vietnam, including the role of public opinion and constitutional issues raised by the war.

30. Students will understand domestic policies after World War II, including the struggle for racial and gender equality and for the extension of civil liberties.

By the end of grade 4:

a. Historic figures such as Martin Luther King, Jr., Malcom X, Rosa Parks, Betty Friedan, and Cesar Chavez involved in the civil rights and women's movements. C1.4a; C1.4b

b. Why we celebrate Martin Luther King, Jr. Day. C1.4b

By the end of grade 12:

a. The political debates of the post-WWII era, including Truman's continuation of New Deal policies and his civil rights policies, the rise and fall of McCarthyism, and the American stance toward Soviet communism.

b. The "New Frontier" and the "Great Society." C6.8d and 12d

c. The origin and results of the post-WWII civil rights movement. C6.8d and 12d

d. The women's movement for civil rights and equal opportunities. C6.8d and 12d

e. The Warren Court's role in addressing civil liberties and equal rights. C6.8d and 12d; C7.12d

UNITED STATES HISTORY

Era 10: Contemporary United States (1968 to present)

31. Students will understand political, economic, social, and cultural developments in contemporary United States.

GRADE 4

By the end of grade 4:

a. The stories of historic figures of the twentieth century who exemplified values and principles of American democracy, including Susan B. Anthony, Jane Addams, Theodore Roosevelt, Franklin Delano Roosevelt, Eleanor Roosevelt, and Lyndon Baines Johnson. C1.4ab

b. How family life has changed in the course of the twentieth century.

GRADE 12

By the end of grade 12:

a. Domestic politics since 1968 to the present, including the efforts of presidential administrations to address social and environmental issues, the effects of Watergate on public perception of government, and constitutional issues raised by the Iran-Contra affair.

b. Major foreign policy initiatives, including policies toward the Union of Soviet Socialist Republics (USSR) and the People's Republic of China. C11.12bc

c. Changes in the U.S. economy since 1968, including scientific and technological advances and international economic competition.

d. The new immigration after 1965 and demographic shifts. G10.12b

e. Changing religious diversity and its impact on American institutions and values. C6.8d

f. Contemporary American culture, including the effects of desegregation efforts, the increasing influence of the media, and tensions between individual and group rights. C12.8c and 12b

32. Students will understand long-term changes, enduring influences, and recurring patterns in world history.

By the end of grade 4:

a. Illustrate or retell the main ideas in folktales, legends, ballads, myths, tall tales, and stories of heroism from the history and traditions of various peoples around the world. E3.4a; F2.4ad; F5.4a

b. Compare and contrast fictionalized accounts of historical events with primary sources about the events.

c. Explain the ways people over time, around the world, have used oral traditions, literature, songs, art, religion, community celebrations, ceremonies, mementos, food, and language to share and pass on their beliefs and values. A15.8a; F4.4c; F5.4bc

d. Explain the customs related to important holidays and ceremonies in various countries. F4.4c

By the end of grade 12:

a. Trace major changes in world population from paleolithic times to the present and explain why these changes occurred, including the effects of major disease pandemics. G10.12d

b. Analyze why humans have built cities and how the character, function, and number of cities have changed over time. G10.8f and 12d

c. Assess the validity of the concept that the revolutions of toolmaking, agriculture, and industrialization constituted the three most important turning points in human history. S30.8a

d. Trace major patterns of long-distance trade from ancient times to the present and analyze ways in which trade has contributed to economic and cultural change in particular societies or civilizations. G11.8d and 12c

e. Analyze the origins, development, and characteristics of capitalism and compare capitalist systems with other systems for organizing production, labor, and trade. G11.12a

WORLD HISTORY

World History Across the Eras

f. Analyze how ideals and institutions of freedom, equality, justice, and citizenship have changed over time and from one society to another. C5.12b; S28.8c

g. Compare the economic and social importance of slavery and other forms of coerced labor in various societies from ancient times to the present.

h. Analyze the development of the nation-state and how nation-states differ from empires or other forms of political organization. C10.12a

i. Analyze the circumstances under which European countries came to exercise military and economic dominance in the world in the late nineteenth and twentieth centuries.

j. Compare political revolutionary movements of the past three centuries in terms of ideologies, organization, and successes or failures.

33. Students will understand the processes that gave rise to the earliest human communities and that led to the emergence of agricultural societies.

By the end of grade 12:

a. Early hominid development in Africa and how human communities populated and adapted to the major regions of the world. G10.4bc

b. How humans established settled communities and farming societies around the world. G10.4bc; S31.8a

WORLD HISTORY

Era 2: Early Civilization and the Emergence of Pastoral Peoples (4000-1000 BCE)

34. Students will understand the major characteristics of civilization and how civilizations emerged in Mesopotamia, Egypt, China, and the Indus valley.

GRADE 12

By the end of grade 12:

a. How and why Mesopotamia, Egypt, and the Indus valley became centers of dense population, urbanization, and cultural innovation in the fourth and third millennia BCE.

b. How and why commercial and cultural interactions contributed to change in the Tigris-Euphrates, Indus, and Nile regions.

c. How and why civilization emerged in northern China in the second millennium BCE, including bronze-making technology, the development of social hierarchy, religious institutions, and writing.

35. Students will understand the political, social, and cultural consequences of population movements and militarization in Eurasia and Africa in the second millennium BCE.

GRADE 12

By the end of grade 12:

a. How population movements from western and Central Asia affected peoples of India, Southwest Asia, and the Mediterranean region. G10.8b and 12c

b. The social and cultural effects that militarization and the emergence of new kingdoms had on peoples of Southwest Asia and Egypt. G12.8b

c. How and why urban society expanded in the Aegean region in the era of Mycenaean dominance, including the cultural influences of Egypt, Minoan Crete, and Southwest Asian civilizations. G11.8d

36. Students will understand innovation and change from 1200 to 600 BCE.

By the end of grade 12:

a. State-building, trade, and migrations that led to increasingly complex interrelations among peoples of the Mediterranean basin and Southwest Asia. G10.8b; G11.8d; G12.8b

b. How and why states developed in the upper Nile valley and Red Sea region and how iron technology contributed to the expansion of agricultural societies in Sub-Saharan Africa. S30.5abc; 8a

c. How pastoral nomadic peoples of Central Asia began to play an important role in world history, including the effects of the mastery of horse riding on nomadism and warfare.

d. The achievement and growth of Olmec civilization, including the influence of maize cultivation, the calendar, glyphic writing, sculpture, and monumental building.

37. Students will understand the emergence of Aegean civilization and how interrelations developed among peoples of the eastern Mediterranean and Southwest Asia from 600 to 200 BCE.

By the end of grade 12:

a. The achievements and limitations of the democratic institutions that developed in Athens and other Aegean city-states. C5.12b

b. The major cultural achievements of Greek civilization in art, science, literature, and philosophy.

c. The development of the Persian (Achaemenid) empire and the consequences of its conflicts with the Greeks. G12.8b

d. Alexander of Macedon's conquests and the interregional character of Hellenistic society and culture, including the influence of Greek, Egyptian, Persian, and Indian cultural traditions on one another. G12.8b and 12a

WORLD HISTORY

Era 3: Classical Traditions, Major Religions, and Giant Empires (1300 BCE-1000 CE)

38. Students will understand how major religions and large-scale empires arose in the Mediterranean basin, China, and India from 1300 BCE to 1000 CE.

By the end of grade 12:

a. Emergence of Judaism and the historical significance of Hebrew kingdoms.

b. The causes and consequences of the unification of the Mediterranean basin under Roman rule, including the major legal, artistic, architectural, technological, and literary achievements. C5.12b; G11.8a; G12.8b; S30.5abc and 8a

c. The emergence of Christianity in the context of the Roman Empire.

d. How China became unified under the early imperial dynasties, including the development of iron technology, the significance of the trans-Eurasian "silk roads," and the emergence of Confucianism and Daoism. G11.8d and 12bc; S30.5abc and 8a

e. Religious and cultural developments in India in the era of the Gangetic states and the Maurya Empire.

39. Students will understand imperial crises and their aftermath, from 300 to 700 CE.

By the end of grade 12:

a. The decline of the Roman and Han empires. G12.12b

b. The synthesis of Hindu civilization in India in the era of the Gupta Empire.

c. The expansion of Hindu and Buddhist traditions in Southeast Asia in the first millennium CE.

40. Students will understand the causes and consequences of the rise of Islamic civilization in the seventh to tenth centuries.

By the end of grade 12:

a. The emergence of Islam, how it spread in Southwest Asia, North Africa, and Europe, and its influence on those regions, including the Byzantine state.

b. The significance of the Abbasid Caliphate as a center of cultural innovation and hub of interregional trade in the eighth to tenth centuries. G11.8d and 12c

41. Students will understand the search for political, social, and cultural redefinition in Europe from 500 to 1300 CE.

By the end of grade 12:

a. Feudalism and the growth of centralized monarchies and city-states in Europe. G12.8b

b. The expansion of Christian Europe after 1000 CE.

c. The patterns of social change and cultural achievement in Europe's emerging civilizations.

WORLD HISTORY

Era 4: Expanding Zones of Exchange and Encounter (300-1500 CE)

42. Students will understand the maturing of an interregional system of communication, trade, and cultural exchange in an era of Chinese economic power and Islamic expansion.

GRADE 12

By the end of grade 12:

a. China's sustained political and cultural expansion in the Tang period (600-900 CE) and its impact on Japan, Korea, and Southeast Asia. G11.12b; G12.12c

b. China's extensive urbanization and commercial expansion between the tenth and thirteenth centuries. G10.8d

c. Political, economic, and cultural developments, including the expansion of Buddhist tradition in Japanese and Southeast Asian civilizations.

d. How pastoral migrations and religious reform movements between the eleventh and thirteenth centuries contributed to the rise of new states and the expansion of Islam. G10.12c; G12.8b

e. The rise of the Mongol Empire and its consequences for Eurasian peoples from 1200 to 1350. G9.12e; G12.8b

43. Students will understand the patterns of crisis and recovery in Eurasia from 1300 to 1450.

GRADE 12

By the end of grade 12:

a. The transformations in Europe following the economic and demographic crises of the fourteenth century, including the Black Death and the recurring plague pandemic.

b. Major political developments in Asia in the aftermath of the collapse of Mongol rule and the plague pandemic.

44. Students will understand the development of agricultural societies and new states, towns, and trade in Africa and Oceania.

By the end of grade 12:

a. State-building in Northeast and West Africa and the southward migrations of Bantu-speaking peoples. G10.12bc

b. The development of towns and maritime trade in East and Southern Africa. G11.8d

c. The peopling of Oceania and the establishment of agricultural societies and states.

45. Students will understand the expansion of states and civilizations in the Americas from 300 to 1500.

By the end of grade 12:

a. The development of complex societies and states in North America and Mesoamerica, including Maya civilization.

b. The rise of the Teotihuacan, Zapotec/Mixtec, and Moche civilizations.

c. The development of the Aztec empire in Mesoamerica and the Inca empire in Andean South America. G11.8a

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WORLD HISTORY

Era 5: The Emergence of the First Global Age (1450-1770)

46. Students will understand economic, political, and cultural interrelations among peoples of Africa, Europe, and the Americas from 1400-1750.

GRADE 12

By the end of grade 12:

a. The consequences of the worldwide exchange of flora, fauna, and pathogens. G10.12c

b. How European states and peoples of European descent became dominant in the Americas between the fifteenth and eighteenth centuries. G10.8a; G12.8b; G14.12a

c. The origins of the trans-Atlantic African slave trade and the consequences for Africa, Europe, and the Americas. G11.8d

d. The encounters, including the exchange of ideas, between Europeans and peoples of Sub-Saharan Africa, Asia, and the Americas in the late fifteenth and early sixteenth centuries. G14.12a

47. Students will understand how European society experienced political, economic, and cultural transformations in an age of global intercommunication from 1450 to 1750.

GRADE 12

By the end of grade 12:

a. Demographic, economic, and social trends in Europe, including the characteristics of family and peasant society, changes in serfdom, consequences of population growth and urbanization, and emerging capitalistic institutions.

b. The political, economic, and cultural impact of the Renaissance, Protestant Reformation, and Catholic Reformation. S9.12b

c. The rising military and bureaucratic power of European states between the sixteenth and eighteenth centuries. G11.8d

d. Major events of the Scientific Revolution and how they contributed to transformations in European society. S9.12b; S14.12a

e. The political, economic, and cultural significance of the Enlightenment in European and world history.

48. Students will understand how large territorial empires dominated much of Eurasia and were transformed in the era of European expansion between the fifteenth and eighteenth centuries.

By the end of grade 12:

a. The extent and limits of Chinese regional power under the Ming dynasty. G12.8b

b. How Southeast Europe and Southwest Asia became unified under the Ottoman Empire. G12.8b

c. The rise of the Safavid and Mughal empires. G12.8b

d. The development of European maritime power in Asia. G12.8b; G14.12a

e. The political, economic, and cultural transformations in India, China, Japan, and Russia in an era of expanding European commercial power.

WORLD HISTORY

Era 6: An Age of Revolutions (1750-1914)

49. Students will understand the causes and consequences of political revolutions in the late eighteenth and early nineteenth centuries.

By the end of grade 12:

a. Antecedents of the French Revolution and how the revolution contributed to political, economic, and cultural transformations in Europe and the world. G12.8b

b. How Latin American countries and Haiti achieved independence in the early nineteenth century.

50. Students will understand the causes and consequences of the agricultural and industrial revolutions from 1700 to 1850.

By the end of grade 12:

a. The connections between social and economic conditions in England and early industrialization. S30.8a

b. How industrial economies expanded and societies experienced economic and social transformations in Europe and the Atlantic basin. G10.8b; G11.8d

c. The causes and consequences of the abolition of the trans-Atlantic slave trade and slavery in the Americas.

51. Students will understand the transformation of Eurasian societies in the era of global trade and rising European power from 1750 to 1870.

By the end of grade 12:

a. How the Ottoman Empire attempted to meet the challenge of Western military, political, and economic power. G11.8a

b. Russian absolutism, reform, and imperial expansion in the late eighteenth and nineteenth centuries.

c. How China's Qing dynasty responded to economic and political crises in the late eighteenth and nineteenth centuries.

d. How Japan was transformed from feudal shogunate to modern nation-state in the nineteenth century.

52. Students will understand patterns of nationalism, state-building, and social reform in Europe and the Americas from 1830 to 1914.

By the end of grade 12:

a. How modern nationalism affected European politics and society.

b. The impact of new social movements and ideologies on nineteenth-century Europe.

c. Cultural, intellectual, and educational trends in nineteenth-century Europe.

d. The political, economic, and social transformations in the Americas in the nineteenth-century, including the successes and failures of democracy in Latin America and nation-building and self-government in Canada. G12.8b

WORLD HISTORY

Era 6: An Age of Revolutions (1750-1914)

53. Students will understand patterns of global change in the era of Western military and economic dominance from 1800 to 1914.

GRADE 12

By the end of grade 12:

a. The consequences of political and military encounters between Europeans and peoples of South and Southeast Asia. G12.8b

b. Connections between major developments in science and technology and the growth of industrial economy and society. G11.8e; S13.12g; S30.5abc and 8a; S31.5d and 12a

c. The causes of European settler colonization in the nineteenth century and the consequences for regions into which they moved. G11.8d; G12.8b

d. The causes and consequences of European, American, and Japanese imperial expansion. G12.8b; G14.12a

e. Political and cultural transformations in South, Southeast, and East Asia in the era of the "new imperialism."

f. The varying responses of African peoples to world economic developments and European imperialism. G12.8b

54. Students will understand reform, revolution, and social change in the world economy of the early twentieth century.

By the end of grade 12:

a. The world industrial economy emerging in the early twentieth century.

b. The causes and consequences of important resistance and revolutionary movements of the early twentieth century, including the Boer War, Russian rebellion of 1905, Young Turks, Mexican Revolution, and China's 1911 Republican Revolution. G12.8b

55. Students will understand the causes and global consequences of World War I.

By the end of grade 12:

a. The causes of World War I, including the relative importance of economic and political rivalries, ethnic and ideological conflicts, militarism, and imperialism. G12.12a

b. The global scope, outcome, and human costs of World War I. G11.12a

c. The causes and consequences of the Russian Revolution of 1917. G11.8a

WORLD HISTORY

Era 7: A Half-Century of Crisis and Achievement (1900-1945)

56. Students will understand the search for peace and stability in the 1920s and 1930s.

GRADE 12

By the end of grade 12:

a. Postwar efforts in Europe to achieve lasting peace and social and economic recovery.

b. Economic, social, and political transformations in Africa, Asia, and Latin America in the 1920s and 1930s and the expansion of nationalist movements. G12.8c

c. The interplay between scientific or technological innovations and new patterns of social and cultural life between 1900 and 1940. S30.8a

d. The interplay of new artistic and literary movements with changes in social and cultural life in various parts of the world in the postwar decades. A17.4f

e. The causes and global consequences of the Great Depression, including how the Depression contributed to the growth of socialist and communist movements and to nationalist movements in Africa and Asia and how government, businesses, social groups, and families endeavored to cope with the hardships of the world Depression.

57. Students will understand the causes and global consequences of World War II.

GRADE 12

By the end of grade 12:

a. The causes of World War II, including the influence of the ideologies of fascism and Nazism, the legacy of World War I and the Depression, and Western democracies' failure to effectively oppose fascist aggression.

b. The global scope, outcome, and human costs of World War II. S13.12h; S30.8a

58. Students will understand how post-World War II reconstruction occurred, new international power relations took shape, and colonial empires broke up.

By the end of grade 12:

a. Major political and economic changes that accompanied postwar recovery in Europe and Japan.

b. Why global power shifts took place and the Cold War began in the aftermath of World War II.

c. How African, Asian, and Caribbean peoples achieved independence from European colonial rule.

d. The purposes and organization of the United Nations. C10.8a and 12c; G12.12be

59. Students will understand the forces for change and increasing interaction across the world.

By the end of grade 12:

a. How population explosion, economic interdependence, and environmental changes have altered conditions of life around the world. C10.8b and 12b; G10.8b; S30.5c; S31.8b

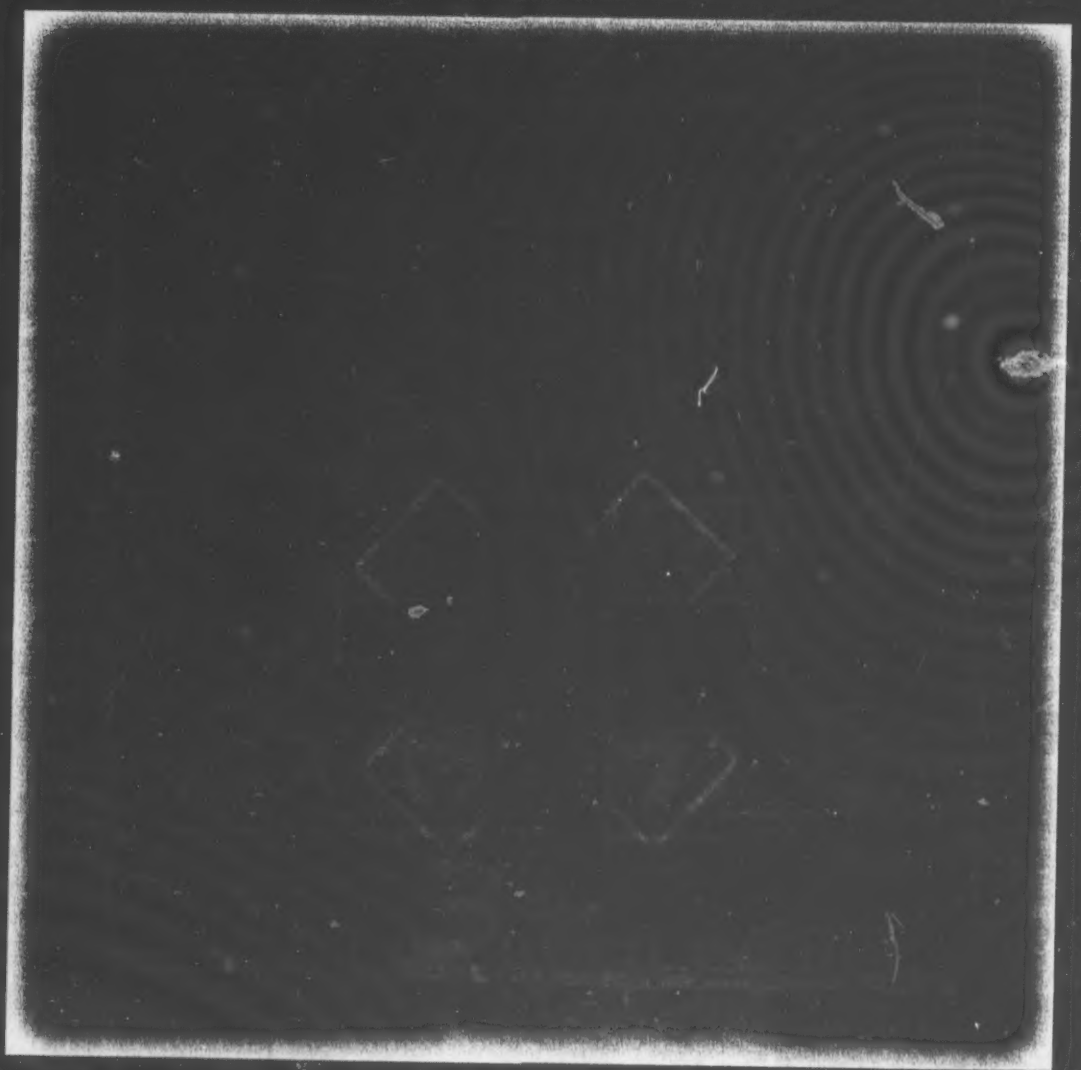
b. How liberal democracy, market economies, and human rights movements have reshaped political and social life. C10.8b and 12b

c. Major sources of tension and conflict in the contemporary world and efforts that have been made to address them. C10.8b; G12.12b; S30.5d, 8d and 12cd; S31.8c and 12c

d. Major worldwide scientific and technological trends for the second half of the twentieth century. C10.12b; S30.5abc, 8ab and 12ae; S32.8d and 12bcd

e. Worldwide cultural trends of the second half of the twentieth century, including the influence of electronic media, the arts and literature, and the roles of religion in modern life. C10.12b; S30.2a

Mathematics Standards



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Mathematics Standards Introduction

"'Rithmetic," one of the classic "three R's" in education, is widely recognized as an essential component of all students' learning. We use arithmetic daily and virtually everywhere—cooking, shopping, calculating taxes, building, planning what time to meet someone, and keeping score in a game all require at least a basic level of proficiency in arithmetic. The practical benefits of mathematics, however, extend well beyond the uses of basic arithmetic. We use mathematics to reason, solve problems, communicate ideas, and represent complex events. Geometric shapes, measurement, probability, graphs, and algebraic equations enable people to understand and describe the world.

In addition to its many real-world applications, mathematics is also pursued for its intrinsic value. Many people argue that the study of mathematics is worthwhile simply for understanding the underlying beauty of its logic and creativity and for mastering its intellectual challenges. In this sense, studying mathematics is important for the same reasons as learning about the arts or solving puzzles: Students develop an appreciation for logic, creativity, and difficult, thoughtful work.

However, not everyone needs to understand higher-order math concepts to function on a day-to-day basis or to appreciate the beauty, logic, and intellectual challenge of mathematics. How much and what kind of mathematics, then, should all students learn? Americans demand that all students learn the "basics." Usually, people define the basics as knowing how to add, subtract, multiply, and divide as well as how to make change, measure, and solve simple word problems. That is not enough, though. Now more than ever, the success of our society and its individuals depends on our ability to think abstractly and to link and apply ideas in ways that allow us to understand the world around us. Individuals who are limited in their ability to do so face fewer opportunities and understand the world less than those who can. Fortunately, mathematics is a discipline that has, over thousands of years, developed processes and sets of rules to help people think in abstract, systemic ways and apply their thinking to reason, solve real problems, and communicate.

But to do so requires much more than an understanding of the basic concepts of mathematics. It requires an understanding of all of the mathematical fields—including arithmetic, measurement, geometry, algebra, trigonometry, statistics, and calculus—and how they relate to each other. CBE believes all students should learn concepts and skills deemed necessary for fluency in each of these topics.

Mathematics Standards Introduction

To convey the essential mathematical knowledge and skills that all students should have, the Standards for Excellence in Education (SEE) mathematics standards are organized into two groups. The first seven standards represent the major concepts and areas of mathematics: numbers and number sense, computation and estimation, measurement, statistics and probability, geometry, algebra, and patterns and relationships. Other subjects traditionally taught in schools, such as trigonometry and calculus, are embedded in these standards. The last four standards cover overarching skills students should be able to perform in all mathematics disciplines: solving problems, reasoning, communicating, and connecting mathematics topics to one another and to other subjects. In addition, relatively new subjects and methods, such as the use of calculators and computers, are included in these standards.

One caveat about the SEE mathematics standards is in order. Although knowledge and skills are presented separately, they should not be taught or learned separately. Learning problem solving in the absence of mathematical content is meaningless. Students must understand mathematical concepts before they can use them to solve problems. Skills and content are presented separately simply to emphasize the importance of both skills and knowledge learning and to facilitate presentation.

The SEE mathematics standards are a blend of the state standards from Delaware, New Jersey, and Pennsylvania. The complete, original standards documents can be obtained from the following sources:

Delaware
Mathematics Curriculum Framework
Delaware State Department of Education
P.O. Box 1402
Townsend Building #279
Federal and Lockerman Streets
Dover, DE 19903

The standards are also available on the
Delaware Department of Education's website at
http://www.doe.state.de.us.

Mathematics Standards Introduction

New Jersey

Core Curriculum Content Standards for Mathematics
New Jersey State Department of Education
River View Executive Plaza, Building 100
P.O. Box 500
Trenton, NJ 08625-0500

The standards are also available on the New Jersey Department of Education's website at http://www.state.nj.us/education/.

Pennsylvania

Mathematics Curriculum Framework
Pennsylvania State Department of Education
333 Market Street
Harrisburg, PA 17126-0333

The standards are also available on the Pennsylvania Department of Education's website at http://www.cas.psu.edu/pde.htm.

1. Students will describe and apply relationships among numbers, their uses, and their representations.

By the end of grade 3:

a. Connect physical, verbal, and symbolic representations of whole numbers.

b. Use drawings, diagrams, and models to show the concept of fractions as part of a whole and part of a set. S2.2a

c. Explain how numbers are used in various ways, including counting, representing quantities, measuring, labeling, and indicating location. G2.4a; G3.4b; S2.2a

d. Apply place-value concepts and numeration to counting, ordering, and grouping. S2.2a

e. Explain the connections between operations (for example, multiplication is repeated addition, subtraction and addition are inverse operations); describe the relative effect of operations on whole numbers.

f. Use concrete objects to count, order, group, and demonstrate one-to-one correspondence with whole numbers beyond 100.

g. Identify patterns in number sequences (identify even and odd numbers, count by 2s, 3s, 5s, 10s, and 25s).

By the end of grade 5:

a. Model and connect physical, verbal, and symbolic representations of fractions, decimals, and whole numbers. S2.5b

b. Use concepts of negative numbers in concrete situations (such as on a number line, with temperature).

c. Identify and describe different uses for the same numerical representation (for example, 1/4 can represent a fraction, a division problem, or a ratio) and different representations for the same number (for example, 2,343 is the same as 2,000 + 300 + 40 + 3; and 1 equals 16/16).

d. Use, model, and identify place value and describe its relationship to magnitude.

e. Demonstrate that mathematical operations can represent a variety of problem situations; explain the relative effect of operations on fractions and decimals.

f. Explain, derive, compare, and use relationships among operations and properties of operations.

g. Order fractions, decimals, and whole numbers using physical, verbal, and symbolic representations.

h. Explain and apply number theory concepts (such as primes, multiples, and composites).

By the end of grade 8:

a. Model and connect physical, verbal, and symbolic representations of irrational numbers.

b. Describe how percent, ratio, and proportion apply to mathematical situations (such as rate, similar triangles). S2.8g

c. Apply multiple representations of numbers, including forms of "one" (such as 3/3, 11/11), integers, fractions, decimals, percents, exponents, absolute values, scientific notation, and square roots. S2.8a

d. Explain the relationship of magnitude to different number types, including integers, scientific notation, rational numbers, and powers.

e. Represent and explain the effect of operations on positive and negative numbers.

f. Use the inverse relationships between addition and subtraction, multiplication and division, and exponentiation and root extractions to determine unknown quantities in equations.

g. Distinguish between and order rational and irrational numbers.

By the end of grade 12:

a. Model and connect physical, verbal, and symbolic representations of real numbers.

b. Explain the effect of operations on measurements (for example, the imprecise nature of measurement is amplified with multiplication). S2.12f

2. Students will estimate and compute using mental math, estimation strategies, paper-and-pencil techniques, and technology-supported methods.

By the end of grade 3:

a. Develop proficiency with and memorize basic addition and subtraction facts. S2.2b

b. Add and subtract single- and multi-digit whole numbers. S2.2b

c. Apply addition and subtraction in a variety of situations (such as computing perimeter, extending functions). S2.2b

d. Multiply and divide whole numbers by single-digit numbers.

e. Demonstrate the concept of multiplication as repeated addition and arrays; demonstrate the concept of division as repeated subtraction and as sharing.

f. Use a variety of mental computational methods and estimation skills to find solutions and to determine the reasonableness of calculated answers. S2.2c

g. Apply estimation strategies to a variety of concrete and abstract items and situations, including time and money. S2.2c

h. Determine the value of a set of coins.

i. Read, write, add, and subtract with decimal notation in situations involving money.

By the end of grade 5:

a. Demonstrate proficiency with and memorize basic multiplication and division facts. S2.5a

b. Use algorithms to solve addition, subtraction, multiplication, and division problems with whole numbers, fractions, and decimals. S2.5a

c. Create and solve practical problems involving addition, subtraction, multiplication, and division of whole numbers. S2.5a

d. Select and use the most efficient computational methods, choosing among concrete materials, paper and pencil, estimation, mental computation, and calculators. S2.5a

e. Apply, explain, and assess the appropriateness of a variety of estimation strategies (such as truncation, rounding to compatible numbers). S2.5c

f. Use various forms of estimation, including rounding, to determine the reasonableness of calculated answers; determine if an estimate is too high or too low. S2.5c

g. Make change and solve problems using money.

h. Apply beginning number theory including identifying and using multiples, factors, divisibility, properties of identity, zero and one, and prime and composite numbers.

By the end of grade 8:

a. Apply, model, and explain procedures for computation with different kinds of rational numbers, including fractions, decimals, integers, powers, scientific notation, ratios, proportions, and percents. S2.8a

b. Use multi-step computational procedures with rational numbers.

c. Compute ratios, proportions, and percents to solve practical problems.

d. Compute circumference, area, surface area, and volume of geometric figures; find missing dimensions of right triangles using the Pythagorean theorem. S2.8b

e. Estimate the value of irrational numbers, tips, and discounts.

f. Recall, explain, and use the rules of divisibility, square numbers, prime factorization, and the property of zero with the order of operations.

By the end of grade 12:

a. Add, subtract, multiply, and divide in algebraic procedures and with real numbers. S12.12ab

b. Apply factorials, exponents, and matrices to solve practical problems.

c. Compute permutations and combinations.

d. Assess the error resulting from estimation and rounding. S2.12f

e. Estimate algebraic solutions on a graphing calculator. S2.12c

3. Students will estimate and measure to a required degree of accuracy and precision by selecting and using appropriate units, tools, and technologies.

By the end of grade 3:

a. Estimate and measure length, time, temperature, and weight to the nearest unit using standard and nonstandard measurement. A12.4a; G2.4f; G3.4d; G4.4a; H1.12b; S2.2d; S4.2c; S5.2a

b. Compare and order measurable characteristics (for example, time, temperature, length, weight, capacity, area, perimeter) of different objects on the same dimensions. G3.4b; G4.4a; H1.12bc; S3.2d; S4.2d; S5.2a

c. Tell time to the minute with both analog and digital clocks.

d. Identify coins, their value, and the value of given sets of coins.

e. Find the perimeter and area of rectangles with direct methods, including using concrete objects as tools. A12.4a

By the end of grade 5:

a. Estimate before measuring to determine reasonableness of the solution. A12.4a

b. Select and use appropriate instruments and units for measuring quantities, including perimeter, volume, area, weight, time, and temperature, with specified accuracy; match tools with the attribute they measure (for example, rulers measure length, thermometers measure temperature). A12.4a; G4.8c; S1.5a; S3.5b; S5.5c; S8.2c

c. Add and subtract measurements. A12.4a; S2.5a

d. Identify and use equivalent measurements as required by the situation (for example, 60 minutes = 1 hour, 7 days = 1 week).

e. Solve calendar problems involving days, weeks, months, and years.

By the end of grade 8:

a. Estimate and measure various attributes, including angles, circumference, volume, and surface area, to a specified degree of accuracy. G4.8c; S2.8b

b. Select and use appropriate units and tools to measure a variety of attributes with the degree of accuracy required in a particular problem-solving situation. S2.8e

c. Convert measurements within the same system using linear, square, and cubic units. S2.8d

d. Determine and compare elapsed time using AM and PM.

e. Apply information about time zones and elapsed time to solve problems.

f. Select and apply indirect methods of measurement including formulas (such as the Pythagorean theorem) and algorithms for mathematical relationships (such as scale, proportions, rate). S14.8ab

g. Select and use a variety of methods and tools (such as paper folding, technology) to construct and compare plane figures of given measures.

GRADE 12

By the end of grade 12:

a. Explain the relationship of error, precision, and accuracy in measurement. S2.12f

b. Evaluate the accuracy and precision of measurements resulting from the measuring tools and methods chosen.

c. Convert measurements between various systems, including monetary systems, metric, and U.S. customary systems.

d. Apply indirect methods, including right triangle trigonometry, to find missing dimensions.

e. Apply various measurement systems (such as the Richter Scale, decibels) to describe phenomena and solve problems.

4. Students will use algebraic methods to represent, analyze, and solve mathematical and practical situations involving patterns and functional relationships, with and without technology.

By the end of grade 3:

a. Recognize, reproduce, extend, create, and describe repeating and increasing patterns and sequences using a variety of materials.

b. Use tables, verbal rules, and open sentences to describe patterns and other relationships.

c. Generate and solve simple functions by identifying and applying addition and subtraction patterns.

d. Generate, write, and solve open sentences using informal methods.

e. Use concrete objects and symbols to model the concepts of variables, expressions, equations, and inequalities.

By the end of grade 5:

a. Use patterns and their extensions to make predictions and solve problems.

b. Use rules and variables to describe patterns, functions, and other relationships. S4.5b

c. Generate and solve simple functions by identifying and applying multiplication and division patterns.

d. Find solutions to inequalities from a given replacement set.

e. Solve simple equations using methods such as inverse operations, mental math, and guess-and-check.

f. Use concrete objects and combinations of symbols and numbers to create expressions that model mathematical situations.

By the end of grade 8:

a. Generalize numeric and geometric patterns and sequences to find the next term and the nth term; translate among representations of patterns and relationships.

b. Translate among and use tables of ordered pairs, graphs on coordinate planes, and linear equations as tools to represent and analyze patterns. S14.8ab

c. Analyze functional relationships to explain how a change in one

quantity results in a change in another (e.g., the relationship among length, area, and volume). S4.8d; S29.8b

d. Find the value of a variable by evaluating formulas and algebraic expressions for given values (for example, given L = 4 and W = 7, A = 28).

e. Rewrite formulas in terms of the missing variable (for example, d = rt is equal to r = d/t).

f. Create expressions, equations, and inequalities to model problem situations.

By the end of grade 12:

a. Create and solve linear and quadratic equations and inequalities. S2.12a; S14.12d; S15.12a

b. Add, subtract, multiply, divide, and simplify rational expressions; add, subtract, and multiply polynomials. S2.12a

c. Identify, graph, and describe the graphs of basic families of functions including linear, absolute value, quadratic, and exponential using a graphing calculator; explain why a variety of phenomena can be modeled by the same type of function. S4.12b; S5.12c; S14.12cd; S15.12a

d. Solve systems of equations and inequalities using graphing calculators, symbol manipulations, spreadsheets, and other software. S2.12c; S4.12b

e. Formulate expressions, equations, inequalities, systems of equations, systems of inequalities, and matrices to model problem situations. S14.12cd; S15.12c; S29.12e

f. Use matrices to organize and manipulate data, including matrix addition, subtraction, multiplication, and scalar multiplication.

5. Students will apply the properties and relationships of geometric shapes and figures to represent, investigate, analyze, and solve problems, using tools and technology when efficient.

By the end of grade 3:

a. Use comparative directional and positional words (such as above, inside, left, horizontal, middle).

b. Describe, name, and label related geometric two- and three-dimensional shapes (such as circle and sphere, square and cube, triangle and pyramid, rectangle and prism).

c. Draw two- and three-dimensional geometric shapes and construct rectangles, squares, and triangles using manipulatives (such as geoboards, grid paper).

d. Identify and describe geometric figures in the environment.

e. Identify and create examples of line symmetry.

f. Order simple geometric figures by size.

g. Estimate and determine the perimeter and area of rectangles using manipulatives; demonstrate conservation of area.

h. Describe, identify, and model slides, flips, and turns with geometric figures.

By the end of grade 5:

a. Locate and describe objects in terms of their position with and without compass directions; identify coordinates for a given point or locate points of given coordinates on a grid. G3.4b; G4.4a; S5.5c; G1.4a

b. Compare, contrast, and describe plane and solid figures and shapes using their attributes (such as number of sides, parallel or perpendicular sides, number of vertices, classification of angles).

c. Sketch and identify line segments, midpoint, intersections, and parallel and perpendicular lines.

d. Identify, draw, and measure right, obtuse, and acute angles and their parts, including rays, points, and vertices.

e. Identify and model geometric figures that are congruent, similar, or symmetrical or some combination of these properties.

f. Distinguish between area and perimeter, finding both using a variety of methods.

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g. Analyze and model transformations of geometric figures and rotations of line segments, describing the motions as slides, flips, or rotations.

By the end of grade 8:

a. Use coordinate geometry to represent and interpret relationships defined by equations and formulas (for example, distance, midpoint), translating among ordered pairs, graphs, and equations.

b. Model, classify, compare, and sketch a variety of two- and three-dimensional regular and irregular figures (such as quadrilaterals, tetrahedrons, triangular prisms).

c. Construct geometric figures (such as perpendicular bisectors, geometric figures with given dimensions).

d. Apply properties of equality and proportionality to solve problems involving congruent or similar shapes (for example, create a scale drawing of a proposed playground).

e. Describe and apply geometric properties and relationships (such as congruence, perpendicularity).

f. Describe and apply a variety of strategies for determining circumference, perimeter, area, surface area, angle measure, and volume.

g. Explain and apply the Pythagorean theorem.

h. Draw and describe the results of transformations, including translations, rotations, reflections, and dilations (shrinking or enlarging). S4.8d

By the end of grade 12:

a. Use coordinate geometry to graph linear equations, determine slopes of lines, identify parallel and perpendicular lines, and find possible solutions to sets of equations.

b. Create two-dimensional representations of different views of three-dimensional objects.

c. Construct geometric models, transformations, and scale drawings using a variety of methods and tools (such as paper folding, protractor, technology). S4.12b; S5.12c

d. Identify congruent and similar figures using coordinate geometry; apply this information to solve problems.

e. Use basic trigonometric ratios (right triangle trigonometry) to solve problems involving indirect measurement.

f. Construct a geometric figure and its transformed image.

6. Students will collect, organize, display, and analyze data in order to make decisions and predictions; determine the theoretical and experimental probability of an event to make predictions and solve problems; and interpret, evaluate, and communicate information obtained from a wide variety of sources.

By the end of grade 3:

a. Collect data by observing, measuring, surveying, and counting. G2.4fe; S1.2a

b. Demonstrate a variety of techniques for representing and organizing data (for example, using physical objects, tallies). G3.4a

c. Interpret data by looking for patterns and relationships, considering cause and effect, drawing conclusions, and answering related questions. H2.12d; H4.12e

d. Predict and measure the likelihood of events, and explain why the results of an experiment may not match predicted outcomes.

e. Use concepts of certainty, fairness, and chance to discuss the probability of actual events.

f. Conduct a survey and tally the results. S1.2a

By the end of grade 5:

a. Solve problems that involve systematically collecting, organizing, and analyzing data. G3.4a; H2.12d; H4.12e

b. Discuss the appropriateness of different types of data displays, and use a variety of displays (such as tables, histograms). G2.4e; G4.4b; H2.12d

c. Interpret data, using the mean, and make convincing arguments based on data analysis and previous experiences. H4.12e

d. Find all possible outcomes of a simple experiment using straightforward methods (such as organized lists, tree diagrams). S17.5b and 8a

e. Make predictions based on intuitive, experimental, and theoretical probabilities.

f. Conduct simple probability experiments using concrete materials and represent the results using fractions and probability. S17.5b

By the end of grade 8:

a. Collect, organize, analyze, and display data in a variety of ways (including stem and leaf plots, whisker plots, circle graphs) by hand and with technology. G1.8b; G2.8d; G3.8a; G4.8a; G9.8a; H2.12d; S1.8a; S5.8c

b. Calculate and use the mean, median, mode, and range to interpret data. G4.8c; G9.8a; H4.12e; S2.8c

c. Determine theoretical probability using a variety of methods, including creating a sample space; compare theoretical expectations to experimental results. S2.8f

d. Describe ways to define a sample group; analyze a sample to make inferences about a population. G4.8c; H4.12e; G9.8a

e. Design and conduct a simulation to study a problem and communicate the results. G1.8b

By the end of grade 12:

a. Describe the normal curve in general terms and use its properties to answer questions about sets of data. H4.12e; S5.12b

b. Create and interpret discrete and continuous probability distributions.

c. Use curve fitting to model and draw inferences from data; summarize and interpret single-variable data by choosing measures of central tendency and dispersion. G9.12e; H4.12e; S5.12b; S29.12f

d. Find the probability of simple events, compound events, and independent events using a variety of methods including the fundamental counting principle. S17.12b; S29.12f

e. Analyze the validity of statistical conclusions and the use, misuse, and abuse of data caused by choices of scale, inappropriate choices of central tendency, incorrect curve fitting, or inappropriate use of control groups. G4.12d; G9.12a; H4.12e; S5.12b; S6.8c and 12a

f. Design, conduct, analyze, and communicate the results of multistage probability experiments.

7. Students will select and use a wide variety of tools and technology-supported methods to increase either the efficiency or quality of results.

By the end of grade 3:

a. Represent and examine mathematical situations using concrete materials.

b. Use a four-function or fraction calculator to confirm computations and to explore patterns. S29.2a

c. Use a variety of tools to measure mathematical and physical objects in the environment. G2.4f; S3.5c; S8.2c; S29.2a

By the end of grade 5:

a. Use fraction or similar calculators to verify conjectures and in problem-solving situations.

b. Use technology to gather, analyze, and display mathematical data and information. G2.4c; S3.5c; S33.5c

By the end of grade 8:

a. Use a variety of technologies, including scientific calculators and computers, to evaluate and validate problem solutions. G1.8b; S8.8e; S29.12ef; S33.8a

b. Check the reasonableness of an answer using a calculator or a spreadsheet. S8.8e

c. Use computer spreadsheets, scientific calculators, and graphing calculators. G1.8b; G3.8a; S8.8e; S29.12ef; S33.8a

By the end of grade 12:

a. Use graphing calculators, computers, and computer software effectively and efficiently to define and solve various types of problems. G3.12b; G9.12e; S3.12a; S4.12b; S33.12c

8. Students will apply a wide variety of mathematical concepts, processes, and skills to solve a broad range of problems.

By the end of grade 3:

a. Identify and solve problems arising from mathematical situations and everyday experiences.

b. Represent and solve problem situations with concrete, pictorial, symbolic, and graphic models.

c. Specify that there may be multiple ways to solve a problem.

d. Verify the correctness and reasonableness of results.

e. Determine, collect, organize, and analyze data needed to solve problems. S1.2a; S8.5a

By the end of grade 5:

a. Know when to select and how to use mathematical tools and methods (such as manipulatives, mental math, and paper-and-pencil techniques) as a part of the problem-solving process. S2.5a

b. Construct, explain, justify, and apply a variety of problem-solving strategies (for example, make an organized list, guess-and-check).

c. Interpret results in the context of the problem being solved (for example, when determining the number of buses necessary to transport students, the remainder must be rounded up).

By the end of grade 8:

a. Apply processes of mathematical modeling in mathematics, other disciplines, and practical situations. G4.8c; S29.8a

b. Pose, explore, and solve a variety of problems, including those that are non-routine or have a variety of possible strategies or solutions or both. S8.8a

c. Develop, modify, and apply an increasing variety of problem-solving techniques to solve problems (for example, working backward or solving a similar but simpler problem).

d. Weigh the relative merits of various problem-solving approaches before selecting and using a strategy.

e. Persevere in developing alternative problem-solving strategies if initially selected approaches do not work.

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By the end of grade 12:

a. Explore the validity and efficiency of various problem-posing and problem-solving strategies; develop alternative strategies and generalizations as needed.

b. Monitor progress toward solutions.

c. Generalize strategies, make generalizations, and offer solutions to new situations.

9. Students will apply reasoning skills to make sense of, investigate, evaluate, and justify steps in approaches and solutions to mathematical situations.

By the end of grade 3:

a. Make, check, and verify predictions about the quantity, size, and shape of objects and groups of objects. S1.2a

b. Find examples that support or refute mathematical statements. E7.4a

c. Explain why a prediction, estimation, or solution is reasonable. S6.2a

By the end of grade 5:

a. Given a rule or generalization, determine whether the example fits.

b. Use models, number facts, properties, and relationships to check and verify predictions and explain reasoning.

c. Draw logical conclusions about mathematical situations using informal inductive and deductive reasoning. S1.5c

d. Distinguish between relevant and irrelevant information in a mathematical problem.

e. Interpret statements made with the precise language of logic (such as all, every, none, some).

By the end of grade 8:

a. Make conjectures based on logical reasoning, and test conjectures by using counter examples. S6.8b

b. Use "if...then" statements to construct simple valid arguments.

c. Justify and defend the validity of mathematical strategies and solutions using examples and counter examples.

d. Distinguish between inductive and deductive reasoning, using each appropriately. E7.12e; S6.8b; S8.8a

e. Apply proportional and spatial thinking. S4.8d

By the end of grade 12:

a. Construct valid arguments from stated facts. E4.12c

b. Follow and evaluate an argument, judging its validity using reasoning and logic. E2.8bg, 12ef; E7.12lm; S6.12b

c. Use a variety of methods of proofs (for example, direct, indirect, formal, truth tables, paragraph) to validate conjectures.

10. Students will read, listen, and discuss to obtain mathematical information; analyze and use the information; and present and justify mathematical ideas in written, oral, and visual formats.

By the end of grade 3:

a. Listen to and read about mathematical strategies and solutions, and communicate them to others using everyday language and correct mathematical symbols (for example, +, =, >, and so on). E2.4b; E4.4abc; E7.4abfgh; F3.4a; S5.2c

b. Represent and communicate mathematical ideas using concrete and pictorial representations. E7.4g; G3.4a; S5.2c

By the end of grade 5:

a. Identify, explain, and model key mathematical concepts and situations using oral, written, concrete, pictorial, and graphic methods, making certain that the situation is represented unambiguously and accurately. E4.4ac; E7.4fgh; F3.4a; H2.12d

b. Represent and communicate mathematical ideas using tools such as manipulatives, calculators, and computers.

c. Explain and justify mathematical ideas, strategies, and solutions to others, using the correct mathematical vocabulary. E4.4abc; E7.4fgh; F3.4a; S8.56

By the end of grade 8:

a. Identify and explain key mathematical concepts, and model situations using geometric and algebraic methods.

b. Use mathematical language, notation, and symbols to represent problem situations and mathematical ideas. G1.8b; S5.86

c. Analyze, evaluate, and explain mathematical arguments and conclusions presented by others. E1.8b; E7.8bc; S6.8bc

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By the end of grade 12:

a. Formulate questions, conjectures, and generalizations about data, information, and problem situations. E1.12b; E2.12c; E7.12e; F3.12c; G1.12a; G3.12b; S1.12a; S5.12d

b. Present complete and convincing arguments and justifications adapted to be effective for various audiences. E4.12acdf; E5.8d; E7.12e

c. Use technology (such as spreadsheets, presentation software) to present information and ideas. G3.12ab

d. Use properties, models, known facts, and relationships to explain and defend thinking.

11. Students will relate and link mathematical ideas, concepts, and procedures within the discipline, among other content areas, and to everyday situations.

By the end of grade 3:

a. Observe and describe the connections between mathematical concepts (for example, addition and subtraction, whole numbers and fractions).

b. Make and describe connections linking conceptual and procedural knowledge.

c. Apply mathematical skills and processes to other disciplines and to everyday situations.

By the end of grade 5:

a. Connect numbers to their various uses including counting (how many), measuring (how much), labeling (what), and indicating location (where).

b. Describe the connections and translate between various representations of equivalent numbers (such as 3/3 = 1, 10% of a dollar = 1 dime).

By the end of grade 8:

a. Use mathematical ideas from one area of mathematics (for example, an equation or formula from algebra) to explain an idea from another area of mathematics (for example, the area of a triangle).

b. Identify and use connections between various mathematical topics (for example, extending the addition algorithm to addition of polynomials, building upon existing knowledge).

By the end of grade 12:

a. Use the connections among mathematical topics to develop multiple approaches to problems.

b. Relate procedures in one representation of a problem to procedures in an equivalent representation.

c. Describe how mathematics is used in various careers.

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Science Standards

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Science Standards Introduction

Science education provides an important basis for our understanding of the world and our life in it. The skills and knowledge of science that students now can acquire are drawn from areas of inquiry where the progress of human knowledge has been especially clear and striking, and represent an enormous resource for improving American students' individual and social well-being. It doesn't take a rocket scientist to see the value of scientific understanding for the ordinary citizen's life, nor does it take one to appreciate the value of having a few rocket scientists. The science standards provide sound guidance for both those students who need a practical understanding of how nature works and those who may eventually choose to pursue scientific learning for loftier purposes.

Scientific literacy plays a significant part in ordinary everyday life. People can take advantage of scientific knowledge in all sorts of activities; fixing things around the home, taking care of plants, or making decisions about what to eat, how to exercise, or when to seek medical attention can all benefit from scientific information. Even watching the TV weather forecast or driving a car safely involves some awareness of scientific ideas or principles and their applications.

Beyond the actual knowledge that science provides, the reasoning strategies associated with scientific progress and inquiry can be applied to a wide variety of questions. Looking for evidence, understanding what the evidence does and does not prove, and thinking independently about what caused something or where a better solution might be found are all skills that are integral to science. The reasoning techniques of scientific inquiry can be applied both to plainly scientific problems and in other areas of life. Scientific literacy is as much about how to think when you don't know an answer as it is about knowing the answers that science has already found.

Jobs also often require scientific reasoning skills and knowledge. From car repair to nursing to scientific research, professional work often involves some scientific knowledge, in ever-increasing proportions. The more we rely on technology to do things, the more we need people who understand how to use the technology. Students need to acquire sufficient familiarity with science to enable them to choose further training for work or professional education that requires some amount of prior education in science.

Science Standards Introduction

Society faces large and small problems that are solved by applying scientific knowledge and technology. Sometimes these problems are created in part by the disadvantages of existing technology, such as the pollution produced as a result of the internal combustion engine. Even so, society's response requires understanding the consequences of the various options, which involves a scientific comprehension of the situation. Individual and public support for particular solutions depend on public understanding of the consequences of improving the existing technology versus the practicality and consequences of developing and using alternative technological approaches. As citizens and as individuals inhabiting some corner of the world, people need to possess a level of scientific literacy that enables them to participate in a wide range of social and political decision making.

Finally, students should learn about science simply for its own sake. The splendid patterns and workings of the universe and the living things within it are worth understanding for their own sake, just because the happenings of nature are so wonderful. Scientific inquiry inspires the human imagination and sense of beauty through the effort to figure out the nature of things.

The SEE science standards present the skills and knowledge for a level of scientific literacy that everyone should attain. This literacy enables people to approach the challenges of life equipped with reasoning abilities useful for a wide range of problems and with an understanding of scientific concepts that underlie our explanations for a wide variety of facts and events. While the skills and knowledge are presented separately in order to focus attention on both dimensions of scientific literacy, it should be clear that these dimensions build upon each other: The skills enable people to extend the use of their scientific knowledge, while the knowledge reflects the power and coherence of rigorous and imaginative scientific thinking.

The 34 content standards and accompanying grade-level benchmarks for science given here are drawn from work originally carried out by the American Association for the Advancement of Science (AAAS). The first six standards represent the skills or habits of mind that are central to thinking in science. The next two standards represent the nature of science and scientific inquiry in general. After that there are seven standards about the physical world, six standards about living things and their environment,

and seven about the human organism and behavior. Two standards about technology and design follow, accompanied by four standards concerning the applications of technology in various areas where science and technology have had an especially important impact.

There are more standards in science than there are in most of the other subjects, and the grade-level benchmarks are often longer. This is due to both the substance and the style of the science material. The subject of science in school is supported by a number of different academic disciplines, including physics, astronomy, geology, chemistry, and biology, and so they cover a fairly wide range of knowledge of the natural world. Also included are some standards concerning the scientific study of society, as well as standards devoted to the application of science through technology. Differences in the way the standards are presented also contribute to their length: Most of the science standards directly present what students are actually supposed to understand, rather than using a form of description that talks about what students are supposed to know. The grade levels for which they are written—for the years of student learning through grades 2, 5, 8, and 12—create four layers of benchmarks in the kindergarten- through twelfth-grade series (rather than the three layers represented in most of the other subjects in this book). These benchmark layers provide a sketch of the development of students' understanding as they progress through school.

These standards and benchmarks are based on *Benchmarks for Science Literacy*, a publication of the AAAS's Project 2061, which offers recommendations for what all American students should know and be able to do. Project 2061's publications—especially *Science for All Americans*—present a unified and coherent picture of expectations for student learning in the natural sciences, social sciences, mathematics, and technology and include several different products designed to strengthen standards-based science education. The content and spirit of these standards are also fundamentally the same as those of the *National Science Education Standards* produced by the National Research Council of the National Academy of Sciences. In a few places, the SEE benchmarks contain additional material drawn from the *National Science Education Standards*. To fit the format and purposes of this book, the benchmark statements have been revised, reduced, and rearranged somewhat under CBE's own headings, but the aim has been to

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preserve the essential message of *Benchmarks for Science Literacy.* Since the mathematics standards for the SEE project are drawn from elsewhere, benchmarks in science that reflect mathematical content have been retained and presented here only as they are applied specifically to scientific inquiry. A more elaborate and detailed presentation of the material may be found in the various publications of Project 2061, including *Benchmarks for Science Literacy* and *Science for All Americans.*

Benchmarks for Science Literacy can be obtained by calling Oxford University Press at 1-800-451-7556.

HABITS OF MIND

1. Students will be aware of the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.

By the end of grade 2:

a. Raise questions about the world around them and be willing to seek answers to some of the questions by making careful observations and trying things out. G1.4a; M6.3af; M8.3e; M9.3a

By the end of grade 5:

a. Keep records of investigations and observations and not alter the records later. G2.4f; M3.5b; M6.5a

b. Carefully distinguish observations from ideas and speculation about those observations.

c. Offer reasons for findings and consider reasons suggested by others. M9.5c

By the end of grade 8:

a. Understand the importance of—and keep—honest, clear, and accurate records in science. M6.8a

b. Understand that hypotheses are valuable if they lead to fruitful investigations, even if the hypotheses turn out not to be true.

By the end of grade 12:

a. Understand how curiosity, honesty, openness, and skepticism affect the progress of scientific inquiry, and exhibit those traits in their own scientific activities. H3.12aeghj; M10.12a

b. Know that different explanations often can be given for the same evidence, and it is not always possible to tell which one is correct.

2. Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.

By the end of grade 2:

a. Use whole numbers and simple, everyday fractions in ordering, counting, identifying, measuring, and describing things and experiences. M1.3bcd

b. Readily give the sums and differences of single-digit numbers in ordinary, practical contexts and judge the reasonableness of the answer. M2.3abc

c. Give rough estimates of numerical answers to problems before doing them formally. M2.3fg

d. Make quantitative estimates of familiar lengths, weights, and time intervals, and check them by measuring. M3.3a

By the end of grade 5:

a. Add, subtract, multiply, and divide whole numbers mentally, on paper, and with a calculator. M2.5abcd; M3.5c; M8.5a

b. Use fractions and decimals, and translate between decimals and commonly encountered fractions—halves, thirds, fourths, fifths, tenths, and hundredths (but not sixths, sevenths, and so on)—in scientific calculations. S1.5a

c. Judge whether measurements and computations of quantities, such as length, area, volume, weight, or time, are reasonable answers to scientific problems by comparing them to typical values. M2.5ef

By the end of grade 8:

a. Analyze scientific data by using, interpreting, and comparing numbers in several equivalent forms, such as integers, fractions, decimals, and percents. M1.8c; M2.8a

b. Calculate the circumferences and areas of rectangles, triangles, and circles, and the volumes of rectangular solids used in scientific problems. M2.8d; M3.8a

c. Find the mean and median of a set of scientific data. M6.8b

d. Use the input units (such as seconds, square inches, or dollars per tankful) of scientific calculations to determine the proper unit for expressing the answer. Convert compound units (such as miles per hour into feet per second) in scientific expressions. M3.8c

e. Decide what degree of precision is adequate, and round off the result of calculator operations to enough significant figures to reasonably reflect those of the inputs. M3.8b

f. Estimate probabilities of outcomes in scientific experiments on the basis of prior trials or the number of possible outcomes. M6.8c

g. Use ratios and proportions, including constant rates, in appropriate problems. M1.8b

GRADE 12

By the end of grade 12:

a. Find answers to scientific problems by substituting numerical values in simple algebraic formulas, and judge whether the answer is reasonable by reviewing the process and checking against typical values. M2.12a; M4.12ab

b. Make up and write out simple algorithms for solving problems that take several steps. M2.12a

c. Use computer spreadsheet, graphing, and database programs to assist in quantitative analysis of scientific data. M2.12e; M4.12d; M7.12a

d. Compare scientific data for two groups by representing their averages and spreads graphically.

e. Express and compare very small and very large numbers in scientific problems using powers-of-ten notation. Recall immediately the relations among 10, 100, 1000, 1 million, and 1 billion (knowing, for example, that 1 million is a thousand thousands).

f. Trace the source of any large disparity between an estimate and the calculated answer for a scientific problem. Consider the possible effects of measurement errors on calculations. M1.9b; M2.12d; M3.12a

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3. Students will be able to use tools and instruments for observing, measuring, and manipulating objects in scientific activities.

By the end of grade 2:

a. Use ordinary hand tools and instruments to construct, measure, and look at objects.

b. Assemble, describe, take apart, and reassemble constructions using interlocking blocks, erector sets, and other things.

c. Make something that can actually be used to perform a task, using paper, cardboard, wood, plastic, metal, or existing objects. A14.4d

By the end of grade 5:

a. Choose appropriate common materials for making simple mechanical constructions and repairing things.

b. Measure and mix dry and liquid materials in prescribed amounts, exercising reasonable safety. M3.5b

c. Use cameras and tape recorders for capturing information. M3.3c; M7.3c and 5b

By the end of grade 8:

a. Use computers to store and retrieve scientific information in topical, alphabetical, numerical, and keyword files, and create simple files.

b. Inspect, disassemble, and reassemble simple mechanical devices and describe what the various parts are for. Estimate the effect of making a change in one part of a system on the system as a whole.

c. Read analog and digital meters on instruments used to make direct measurements of length, volume, weight, elapsed time, rates, and temperature, and choose appropriate units for reporting various magnitudes.

By the end of grade 12:

a. Use computers and scientific data to produce tables and graphs and to make spreadsheet calculations. M7.12a

b. Troubleshoot common mechanical and electrical systems, checking for possible causes of malfunction, and decide on that basis whether to make a change or get advice from an expert before proceeding.

c. Develop and use systematic procedures for recording and organizing information.

HABITS OF MIND

4. Students will be able to use the ideas of system, model, change, and scale in exploring scientific and technological matters.

By the end of grade 2:

a. Identify the parts of things, such as toys or tools, and identify what things can do when put together that they could not do otherwise.

b. Use a model—such as a toy or a picture—to describe a feature of the primary thing.

c. Describe changes in the size, weight, color, or movement of things, and note which of their other qualities remain the same. M3.3a

d. Compare very different sizes, weights, ages, and speeds of both man-made and natural things. M3.3b

By the end of grade 5:

a. Observe and describe how parts influence one another in things with many parts.

b. Use geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories to represent corresponding features of objects, events, and processes in the real world. Identify ways in which the representations do not match their original counterparts. G2.8b

c. Identify patterns of change in things—such as steady, repetitive, or irregular change—using records, tables, or graphs of measurements where appropriate. M4.5b

d. Identify the biggest and the smallest possible values of something.

By the end of grade 8:

a. Observe and explain how parts are related to other parts in systems such as cars, computers, and creatures, including how the output from one part of a system (in the form of material, energy, or information) can become the input to other parts.

b. Identify several different models (such as physical replicas, pictures, and analogies) that could be used to represent the same thing, and evaluate their usefulness, taking into account such things as the model's purpose and complexity. A14.8a

c. Distinguish unchanging systems where nothing is happening from unchanging systems where what happens is counterbalanced by other occurrences.

d. Describe and explain ways that systems' properties that depend on volume, such as capacity and weight, change out of proportion to properties that depend on area, such as strength or surface processes. M4.8c; M5.8dh; M9.8e

By the end of grade 12:

a. Apply the concept of a system to the analysis of how things work and the design of solutions to problems. Specify the system's boundaries and subsystems, its relation to other systems, and its input and output.

b. Understand that computers are used to develop, test, and revise models, including mathematical models that involve long, complicated, or repetitive computations, and graphic models that simulate complicated processes or make it possible to design and test devices and structures. M4.12cd; M5.12c; M7.12a

c. Explain how systems in equilibrium may return to the same state of equilibrium when the disturbances are small and how large disturbances may destroy a system's equilibrium and eventually result in a different state of equilibrium.

d. Understand how large changes in scale typically change the way things work in physical, biological, or social systems because the changes in scale affect various properties of those systems in different degrees.

HABITS OF MIND

5. Students will be able to communicate scientific ideas and activities clearly.

By the end of grade 2:

a. Describe and compare things in terms of number, shape, texture, size, weight, color, and motion. M3.3a

b. Draw pictures that correctly portray features of the thing being described. A14.4b

c. Explain to other students how to solve numerical problems as part of scientific activity. M10.3ab

By the end of grade 5:

a. Write instructions that others can follow in carrying out a scientific procedure. E7.4d; F1.4a

b. Make sketches to aid in explaining scientific procedures or ideas. A14.4b and 8a

c. Use numerical data in describing and comparing objects and events. M3.5b; M5.5a

d. Locate scientific information in reference books, back issues of newspapers and magazines, CD-ROMs, and computer databases. E4.8d

By the end of grade 8:

a. Write clear, step-by-step instructions for conducting scientific investigations, operating something, or following a procedure. E5.8f; F1.8a

b. Understand and describe writing for scientific purposes that incorporates circle charts, bar and line graphs, two-way data tables, diagrams, and symbols. M10.8b

c. Organize scientific information in simple tables and graphs, and identify relationships they reveal. H2.12d; M6.8a

GRADE 12

By the end of grade 12:

a. Write clear, coherent accounts of scientific activities, including possible analyses and alternative interpretations of the results. E5.8c

b. Choose appropriate summary statistics to describe group differences, always indicating the spread of the data as well as the data's central tendencies. M6.12ace

c. Make and use tables, charts, graphs, and scale drawings to make scientific arguments and claims in oral and written presentations. M4.12c; M5.12c

d. Participate in group discussions on scientific topics by restating or summarizing accurately what others have said, asking for clarification or elaboration, and expressing alternative positions. C1.12c; E7.4ab and 8b; M10.9a

HABITS OF MIND

6. Students will be able to question scientific claims and arguments effectively.

By the end of grade 2:

a. Ask "How do you know?" in appropriate situations, and attempt reasonable answers when others ask them the same question. E7.4a; M9.3c

By the end of grade 5:

a. Support statements with facts found in books, articles, and databases, and identify the sources used. E4.4efgh

b. Identify when comparisons might not be fair because some conditions are different.

By the end of grade 8:

a. Question claims based on vague attributions (such as "Leading doctors say...") or on statements made by people outside the area of their particular expertise.

b. Identify the flaws of reasoning in arguments in which (1) fact and opinion are intermingled or the conclusions do not follow logically from the evidence given, (2) an analogy is not apt, (3) no mention is made of whether the control groups are very much like the experimental group, or (4) all members of a group (such as teenagers or chemists) are implied to have nearly identical characteristics that differ from those of other groups. E2.4f and 12f; M9.8ad

c. Question the value of arguments based on very small samples of data, biased samples, or samples for which there was no control sample. M10.8c; M6.12e

d. Recognize that there may be more than one good way to interpret a given set of findings.

By the end of grade 12:

a. Identify the flaws of arguments based on the faulty, incomplete, or misleading use of numbers, such as instances in which (1) average results are reported, but not the amount of variation around the average, and (2) a percentage or fraction is given, but not the total sample size (as in "9 out of 10 dentists recommend..."). M6.12e

b. Make explicit the critical assumptions behind any line of reasoning so that the validity of the position being taken—whether one's own or that of others—can be judged. Use and correctly interpret relational terms—such as "if ... then ... ," "and," "or," "sufficient," "necessary," "some," "every," "not," "correlates with," and "causes"—in scientific arguments. C1.12c; M9.12b

c. Suggest alternative ways of explaining data and criticize arguments in which data, explanations, or conclusions are represented as the only ones worth consideration, with no mention of other possibilities. Determine whether both supporting and contrary data relevant to a claim have been set out.

THE NATURE OF SCIENCE

7. Students will be familiar with the character of scientific knowledge and how it is achieved.

By the end of grade 2:

a. When a science investigation is done the way it was done before, we expect to get a very similar result.

By the end of grade 5:

a. Similar scientific investigations seldom produce exactly the same results, which may differ due to unexpected differences in whatever is being investigated, unrecognized differences in the methods or circumstances of the investigation, or observational uncertainties.

b. Some scientific knowledge is very old and yet is still applicable today.

By the end of grade 8:

a. When similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, which often takes further studies to decide. Even with similar results, scientists may wait until an investigation has been repeated many times before accepting the results as correct.

b. As new information challenges prevailing theories or a new theory leads to looking at old observations in a new way, scientific knowledge may change.

GRADE 12

By the end of grade 12:

a. Scientists assume that the universe is a vast single system in which the basic principles are the same everywhere. The principles may range from very simple to extremely complex, but scientists operate on the belief that the principles can be discovered.

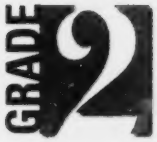
b. From time to time, major shifts occur in the scientific view of how the world works. More often, however, the changes that take place in the body of scientific knowledge are small modifications of prior knowledge.

c. Hypotheses often guide scientists' choices of what data to pay attention to, what additional data to seek, and how to interpret both new and previously available data.

d. While a given theory may fit all the observations made so far, a new theory might fit those observations—and new ones—even better. The process of testing, revising, and occasionally rejecting new and old theories never ends and enables science to reach a progressively better understanding of the world. Progress in scientific understanding often manifests itself in more reliable explanations and more accurate predictions.

THE NATURE OF SCIENCE

8. Students will understand important features of the process of scientific inquiry.



By the end of grade 2:

a. Accurate descriptions are important in science because they enable people to compare observations with those of others.

b. In doing science, it is often helpful to work with a team and to share findings with others. All team members should reach their own individual conclusions, however, about what the findings mean.

c. Tools such as thermometers, microscopes, rulers, and balances often give more information about things than can be obtained by just observing things without help. M3.5b; M7.3c

d. Much can be learned about plants and animals by observing them closely, but care must be taken to know the needs of living things and how to provide for them.

By the end of grade 5:

a. Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments. M8.3e

b. Clear and active communication is an essential part of doing science. It enables scientists to inform others about their work, expose their ideas to criticism by other scientists, and stay informed about scientific discoveries around the world. M10.5c

c. Scientists use technology to increase their power to observe things and to measure and compare things accurately.

d. Science involves many different kinds of work and engages men and women of all ages and backgrounds. H15.4b; H19.4b; H28.4b

By the end of grade 8:

a. Investigations are conducted for different reasons, which include exploring new phenomena, checking on previous results, testing how well a theory predicts, and comparing different theories. Scientific investigations usually involve collecting evidence, reasoning, devising hypotheses, and creating explanations to make sense of the collected evidence. G2.8d; M9.8d; M8.8b

b. If more than one variable changes at the same time in an experiment, the outcome may not be clearly attributable to any one variable. Therefore, scientists often collaborate to design research that is able to account for such situations.

c. When designing investigations and examining data, scientists are aware that their expectations can affect both what they observe and what they miss. To prevent this type of bias, the scientific enterprise uses such strategies as having different investigators conduct independent studies of the same questions.

d. Accurate record keeping, data sharing, and replication of results are essential for maintaining an investigator's credibility with other scientists and society. G2.8d

e. Computers are valuable scientific instruments because they speed up and extend people's ability to collect, store, compile, and analyze data, prepare research reports, and share data and ideas with investigators all over the world. Science is often stimulated by developments in technology and mathematics to address old questions in new ways. M7.8abc

f. In research involving human subjects, the ethics of science normally require that potential subjects be fully informed about the risks and benefits associated with the research and allowed to choose whether to participate or not. Because some people (e.g., young children) and animals cannot make informed choices, special care must be taken in using them in scientific research.

THE NATURE OF SCIENCE

GRADE 12

By the end of grade 12:

a. Some investigators control certain conditions they investigate in order to produce valuable data. When practical or ethical reasons make controlled investigations impossible, scientists rely on the procedure of collecting data from a wide range of natural occurrences to identify patterns.

b. Scientists working together tend to see things alike and may have trouble being entirely objective about their methods and findings. Scientific teams are expected to seek out the possible sources of bias in their investigations' hypotheses, observations, data analyses, and interpretations.

c. Science uses practices such as peer review and publication to reinforce the integrity of scientific activity and reporting.

d. New ideas that challenge accepted opinions often encounter vigorous criticism. Eventually, theories are judged by how they fit with other theories and existing observations and how they guide further research.

e. New ideas in science are limited by the context in which they are conceived. Progress in science and invention is influenced by what else is happening in society, and history is often shaped by scientific and technological developments.

f. Science disciplines and traditions differ from one another in what is studied, techniques used, and outcomes sought, but they share a common purpose and philosophy. As science progresses, the scope and boundaries of particular disciplines are modified and new disciplines are created. Although each discipline provides a conceptual structure for organizing and pursuing knowledge, many problems are studied by scientists using information and skills from many disciplines.

g. Funding influences the direction of science through the decisions that are made on which research to support. Research funding comes from various federal government agencies, industry, and private foundations. C8.12c

h. The ethics of science normally require that research involving risks to human subjects be conducted only with the informed consent of the subjects or the permission of their guardians, even if this constraint limits some kinds of potentially important research or influences the results.

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9. Students will be familiar with current scientific views of the universe and how those views evolved.

By the end of grade 2:

a. There are more stars in the sky than anyone can count, but they are not scattered evenly, and they are not all the same in brightness or color.

b. The sun can be seen only in the daytime, while the moon can be seen sometimes at night and sometimes during the day. The sun, moon, and stars all appear to move slowly across the sky.

c. The shape of the moon looks a little different every day, but looks the same again about every four weeks.

By the end of grade 5:

a. The patterns of stars in the sky stay the same, although they appear to move across the sky nightly, and different stars can be seen in different seasons. Planets change their positions against the background of stars.

b. The earth is one of several planets that orbit the sun, and the moon orbits around the earth.

c. Stars are like the sun, some being smaller and some larger, but so far away that they look like points of light.

d. Telescopes magnify the appearance of some distant objects in the sky, including the moon and planets, and allow people to see many more stars than they can using their unaided eyes.

By the end of grade 8:

a. The sun is a medium-sized star located near the edge of a disk-shaped galaxy of stars known as the Milky Way, part of which can be seen as a glowing band of light that spans the sky on very clear nights. The universe contains many billions of galaxies, each of which contains many billions of stars. To the naked eye, even the closest of these galaxies is no more than a dim, fuzzy spot.

b. The sun is many thousands of times closer to the earth than any other star. Light takes some time to arrive from its source, and so it takes a few minutes for light to arrive from the sun, a few years to arrive from the next nearest star, and several billion years to arrive from some distant galaxies. People on earth, therefore, see the light sources as they were that long ago in the past.

c. Nine planets of very different size, composition, and surface features move around the sun in nearly circular orbits. Some planets have a great variety of moons and even flat rings of rock and ice particles orbiting them. Some of these planets and moons show evidence of geologic activity. The earth is orbited by one moon, many artificial satellites, and debris.

d. Large numbers of chunks of rock orbit the sun. Some of those that the earth meets in its yearly orbit around the sun glow and disintegrate from friction as they plunge through the atmosphere—and sometimes hit the ground. Comets are rocks mixed with ice and have long, off-center orbits that carry them close to the sun. There the sun's radiation (of light and particles) boils off frozen material from the comet's surface and pushes it into a long, illuminated tail.

GRADE 12

By the end of grade 12:

a. For more than 2,000 years, the perception that the earth is large and stationary and that all other objects in the sky orbit it served as the basis for theories about the universe. Ptolemy, an Egyptian astronomer living in the second century AD, devised a model assuming that celestial objects move constantly in perfect circles, and circles on circles. He used this model to predict the motions of the sun, moon, and stars, and even of the irregular "wandering stars" now called planets.

b. In the sixteenth and seventeenth centuries, Copernicus, Kepler, and Galileo each contributed to a dramatically different theory of the universe. Copernicus showed that celestial motions could be explained by imagining that the earth was spinning around once a day and orbiting the sun once a year, but his ideas went against common sense, popular belief, and scientific views of the time. Soon after that Kepler showed that the idea of a sun-centered system worked even better if planets were assumed to follow paths of uneven (but predictable) motion along off-center ellipses, rather than uniform circular paths. Galileo then used the newly invented telescope to discover the moons of Jupiter, sunspots, craters and mountains on the moon, and many more stars than were visible to the unaided eye. Galileo argued that these discoveries supported Copernican theory. He created political, religious, and scientific controversy by writing in favor of the Copernican view of the universe, using Italian rather than the Latin that was the language of scholars at the time. H47.12bd

c. On the basis of scientific evidence, the universe is estimated to be over ten billion years old. The current theory is that its entire contents expanded explosively from a hot, dense, chaotic mass. Stars were condensed by gravity out of clouds of molecules of the lightest elements until nuclear fusion of the light elements into heavier ones began to occur. Fusion released great amounts of energy over millions of years. Eventually, some stars exploded, producing clouds of heavy elements from which other stars and planets could later condense. The process of star formation and destruction continues.

d. The stars differ from each other in size, temperature, and age, but they appear to be made up of the same elements that are found on the earth and to behave according to the same physical principles. Unlike the sun, most stars are in systems of two or more stars orbiting one another.

e. Increasingly sophisticated technology is used to learn about the universe. Visual, radio, and x-ray telescopes collect information from across the entire spectrum of electromagnetic waves; computers handle an avalanche of data and increasingly complicated computations to interpret them; space probes send back data and materials from the remote parts of the solar system; and accelerators give subatomic particles energies that simulate conditions in the stars and in the early history of the universe before stars formed.

10. Students will understand how the position and motion of the earth in the solar system determine seasons and phases of the moon, and know how key features of the earth influence climate and weather.

By the end of grade 2:

a. Some events in nature have a repeating pattern. The weather changes somewhat from day to day, but things such as temperature and rainfall (or snowfall) tend to be high, low, or medium in the same months every year.

b. Water can be a liquid or a solid and can go back and forth from one form to the other. If water is turned into ice and then the ice is allowed to melt, the amount of water is the same as it was before freezing. G7.4b

c. Water left in an open container disappears into the air, but water in a closed container does not.

By the end of grade 5:

a. We live on a relatively small planet, the third from the sun.

b. Like all planets and stars, the earth is approximately spherical in shape. The rotation of the earth on its axis every 24 hours produces the night-and-day cycle. To people on earth, this turning of the planet makes it seem as though the sun, moon, planets, and stars are orbiting the earth once a day.

c. When liquid water disappears, it turns into a gas (vapor) in the air and can reappear as a liquid when cooled or as a solid if cooled below the freezing point of water. Clouds and fog are made of tiny droplets of water.

d. Air is a substance that surrounds us, takes up space, and whose movement we feel as wind. G7.4a

By the end of grade 8:

a. The earth is mostly rock. Three-fourths of its surface is covered by a relatively thin layer of water (some of it frozen), and the entire planet is surrounded by a relatively thin blanket of air. G7.4a

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b. Because the earth turns daily on an axis that is tilted relative to the plane of the earth's yearly orbit around the sun, sunlight falls more intensely on different parts of the earth during the year. The difference in heating of the earth's surface produces the planet's seasons and weather patterns. G6.4a; G7.4b and 8d; G10.4c; G11.8c

c. The phases of the moon are caused by the moon's orbit around the earth once about every 28 days, which changes what part of the moon is lighted by the sun and how much of that part can be seen from the earth.

d. Climates have sometimes changed abruptly as a result of changes in the earth's crust, such as volcanic eruptions or impacts of huge rocks from space. Even relatively small changes in atmospheric or ocean content can have widespread effects on climate if the change lasts long enough. G6.8ad

e. The cycling of water in and out of the atmosphere plays an important role in determining climatic patterns. Water evaporates from the surface of the earth, rises and cools, condenses into rain or snow, and falls again to the surface. The water falling on land collects in rivers and lakes, soil, and porous layers of rock, and much of it flows back into the ocean. G6.8a; G7.8d

f. Heat energy carried by ocean currents has a strong influence on climate around the world.

By the end of grade 12:

GRADE 12

a. Living things are adapted to their surroundings, including the contents of the atmosphere retained by the planet's gravity and the water cycle of liquid and vapor, which is influenced by the intensity of the sun's radiation.

b. Weather (in the short run) and climate (in the long run) involve the transfer of energy in and out of the atmosphere. Solar radiation heats the land masses, oceans, and air. Transfer of heat energy at the boundaries between the atmosphere, the land masses, and the oceans results in layers of different temperatures and densities in both the ocean and atmosphere. The action of gravitational force on oceanic and atmospheric regions causes them to rise or fall—and such circulation, influenced by the rotation of the earth, produces winds and ocean currents. G7.12c

11. Students will be familiar with the scientific view of how the earth's surface is formed and how that view came about.

By the end of grade 2:

a. Rocks come in many shapes and sizes, from boulders to grains of sand and even smaller.

b. Change happens to many things on, above, and below the earth's surface. G7.4c

c. Animals and plants sometimes cause changes in their surroundings.

By the end of grade 5:

a. Waves, wind, water, and ice shape and reshape the earth's land surface by eroding rock and soil in some areas and depositing them in other areas, sometimes in seasonal layers. G6.4bd; G7.4c

b. Rock is composed of different combinations of minerals. Smaller rocks come from the breakage and weathering of bedrock and larger rocks. Soil is made partly from weathered rock, partly from plant remains—and also contains many living organisms. G6.4bd; G7.4c

By the end of grade 8:

a. The interior of the earth is hot. Heat flow and movement of material within the earth cause earthquakes and volcanic eruptions and create mountains and ocean basins. Gas and dust from large volcanoes can change the atmosphere. G6.8a; G7.8abc

b. Some changes in the earth's surface are abrupt (such as earthquakes and volcanic eruptions), while other changes happen very slowly (such as uplift and wearing down of mountains). The earth's surface is shaped in part by the motion of water and wind over very long times, which act to wear down mountain ranges. G6.8a; G7.8abc

c. Sedimentary rock is formed from particles of sand, organic remains, and other materials that are buried and cemented together by heat and pressure that change them into different kinds of rock. Rock bears evidence of the minerals, temperatures, and forces that made them. Deeply buried layers of rock are sometimes forced back up to the surface and may even form mountains. G7.8abc

d. The thousands of layers of rock, their location, and the remains of life forms preserved in them contain evidence of the history of rocks' formation, movement, and erosion. G7.8bc

e. Weathered rock is soil's basic component. Soil's composition, texture, fertility, and resistance to erosion are greatly influenced by plant roots and debris, bacteria, fungi, worms, insects, rodents, and other organisms. G7.8ab

By the end of grade 12:

GRADE 12

a. Until the nineteenth century, most people believed that the earth was created just a few thousand years ago. The publication of Charles Lyell's *Principles of Geology* early in the nineteenth century persuaded many people to believe that the earth was much older. Lyell's book was so persuasive because it contained a wealth of observations on the patterns of rock layers in mountains and the locations of various kinds of fossils, and it used logic carefully to draw inferences from the data.

b. The formation, weathering, sedimentation, and reformation of rock constitute a continuing "rock cycle" in which the total amount of material stays the same as its forms change.

c. The slow movement of material within the earth results from heat flowing out from the deep interior and the action of gravitational forces on regions of different density. G7.12ab

d. While the idea of continental drift was suggested by the matching shapes of the Atlantic coasts of Africa and South America, it took more evidence to become widely accepted. Early in the twentieth century, Alfred Wegener reintroduced the idea along with such supporting evidence as the underwater shapes of the continents, the similarity of life forms and land forms in corresponding parts of Africa and South America, and the increasing separation of Greenland and Europe. But the theory of plate tectonics was not accepted by the scientific community until the 1960s, when further evidence had accumulated and the theory provided a sound physical explanation for a diverse array of seemingly unrelated phenomena associated with such movement. G7.12a

THE PHYSICAL SETTING

e. The solid crust of the earth—including both the continents and the ocean basins—consists of separate plates that ride on a denser, hot, gradually deformable layer of the earth. The crust sections move very slowly, pressing against one another in some places, pulling apart in other places. Ocean-floor plates may slide under continental plates, sinking deep into the earth. The surface layers of these plates may fold, forming mountain ranges. G7.12ab

f. Earthquakes often occur along the boundaries between colliding plates. Molten rock from below creates pressure that is released by volcanic eruptions, helping to build up mountains. Under the ocean basins, molten rock may well up between separating plates to create new ocean floor. Volcanic activity along the ocean floor may form undersea mountains, which can thrust above the ocean's surface to become islands. G7.12ab

12. Students will be familiar with the scientific view of the nature of matter and with how that view evolved.

By the end of grade 2:

a. Objects can be described in terms of the materials they are made of (clay, cloth, paper, etc.) and their physical properties (color, size, shape, weight, texture, flexibility, etc.). A14.4c

b. Things can be done to materials to change some of their properties, but not all materials respond the same way to what is done to them.

By the end of grade 5:

a. Heating and cooling cause changes in materials' properties. Many changes occur faster under hotter conditions.

b. The weight of an object is always the same as the sum of its parts, no matter how they are assembled. If an object is broken into parts, the parts have the same total weight as the original object.

c. Materials are composed of parts that are too small to be seen without magnification.

d. When materials are combined to form a new kind of material, the new material's properties may be different from those of the original materials. A small number of basic kinds of materials can be used to make many different materials.

By the end of grade 8:

a. Scientific ideas about elements were derived more than 2,000 years ago from the ideas of some Greek philosophers, who argued that everything was made from four basic substances: air, earth, fire, and water. The combinations of these "elements" in different proportions were thought to give other substances their observable properties. The Greeks were wrong about those four, but now over 100 different elements have been identified, some rare and some plentiful, out of which everything is made.

b. All matter is made up of atoms, which are far too small to see directly through a microscope. The atoms of any element are alike but are different from atoms of other elements. Atoms may stick together in well-defined molecules or may be packed together in large arrays. All substances consist of atoms grouped into different arrangements.

c. Equal volumes of different substances usually have different weights.

d. Atoms and molecules are always in motion. Increased temperature means greater average energy of motion, so most substances expand when heated. In solids, the atoms are closely locked in position and can only vibrate. In liquids, the atoms or molecules have higher energy, are more loosely connected, and can slide past one another; some molecules may get enough energy to escape into a gas. In gases, the atoms or molecules have still more energy and are free of one another except during occasional collisions.

e. The temperature and acidity of a solution influence reaction rates. Many substances dissolve in water, which can greatly facilitate reactions between them.

f. There are groups of elements that have similar properties, including highly reactive metals, less-reactive metals, highly reactive nonmetals (such as chlorine, fluorine, and oxygen), and some almost completely nonreactive gases (such as helium and neon). Some elements do not fit into any of the categories; among them are carbon and hydrogen, essential elements of living matter.

g. An especially important kind of reaction between substances involves the combination of oxygen with something else—as in burning or rusting.

h. The idea of atoms explains the conservation of matter: If the number of atoms stays the same no matter how they are rearranged, then their total mass stays the same.

i. Antoine Lavoisier's scientific investigations in the decade between the American and French Revolutions led to the modern science of chemistry. Lavoisier's work was based on the idea that when materials react with each other, the total amount of matter always remains the same as before, regardless of any other changes that take place. He successfully tested this concept of conservation of matter by conducting a series of experiments in which he carefully measured all the substances involved in burning, including the gases used and those given off.

GRADE 12

By the end of grade 12:

a. Lavoisier invented a whole new field of science based on a theory of materials, physical laws, and quantitative methods, with the conservation of matter at its core. His system for naming substances and describing their reactions contributed to the rapid growth of chemistry by enabling scientists everywhere to share their findings about chemical reactions with one another without ambiguity.

b. John Dalton's modernization of the ancient Greek ideas of element, atom, compound, and molecule strengthened the new chemistry by providing a physical explanation for reactions. This physical reaction could be expressed in quantitative terms.

c. Atoms are made of a positive nucleus surrounded by negative electrons. An atom's electron configuration, particularly the outermost electrons, determines how the atom can interact with other atoms. Atoms form bonds with other atoms by transferring or sharing electrons.

d. The nucleus, a tiny fraction of the volume of an atom, is composed of protons and neutrons, each almost 2,000 times heavier than an electron. The number of positive protons in the nucleus determines what an atom's electron configuration can be and so defines the element. In a neutral atom, the number of electrons equals the number of protons. But an atom may acquire an unbalanced charge by gaining or losing electrons.

e. Neutrons have a mass that is nearly identical to that of protons, but neutrons have no electric charge. Although neutrons have little effect on how an atom interacts with others, they do affect the mass and stability of the nucleus. Isotopes of the same element have the same number of protons (and therefore of electrons) but differ in the number of neutrons.

f. The nucleus of radioactive isotopes is unstable and spontaneously decays, emitting particles or wavelike radiation or both. It cannot be predicted exactly when, if ever, an unstable nucleus will decay, but a large group of identical nuclei decay at a predictable rate. This predictability of decay rate allows radioactivity to be used for estimating the age of materials that contain radioactive substances.

g. Electrons, neutrons, and protons are made of even smaller particles.

h. When elements are listed in order by the masses of their atoms, the same sequence of properties appears over and over again in the list.

i. Atoms often join with one another in various combinations in distinct molecules or in repeating three-dimensional crystal patterns. An enormous variety of biological, chemical, and physical phenomena can be explained by changes in the arrangement and motion of atoms and molecules.

j. The configuration of atoms in a molecule determines the molecule's properties. Shapes are particularly important in how large molecules interact with others.

k. The rate of reactions among atoms and molecules depends on how often they encounter one another, which is affected by the concentration, pressure, and temperature of the reacting materials. Some atoms and molecules are highly effective in stimulating the interaction of others.

13. Students will be familiar with the forms and transformations of energy and with the significance of energy in understanding the structure of matter and the universe.

By the end of grade 2:

a. Energy keeps things going and makes them warm.

By the end of grade 5:

a. Heat can be produced in many ways, such as burning, rubbing, or mixing one thing with another.

b. When warmer objects are put with cooler ones, the warm ones lose heat and the cool ones gain it until they all reach the same temperature. Heat moves from one object to another at different rates, depending on what the objects are made of and whether they are touching each other.

By the end of grade 8:

a. Energy cannot be created or destroyed but only changed from one form into another.

b. Most of what goes on in the universe—from exploding stars and biological growth to the operation of machines and the motion of people—involves some form of energy being transformed into another. Energy in the form of heat is almost always produced by energy transformations.

c. Energy appears in different forms, such as heat energy in the disorderly motion of molecules, chemical energy in the arrangement of atoms, mechanical energy in moving bodies, gravitational energy in the separation of mutually attracting masses.

d. Heat can be transferred through materials by the collisions of atoms or across space by radiation. In fluids, heat can be transferred by currents.

e. The accidental discovery that minerals containing uranium darken photographic film, as light does, led to the idea of radioactivity. Marie and Pierre Curie isolated two new elements (radium and polonium) that caused most of the radioactivity of the uranium mineral.

THE PHYSICAL SETTING

By the end of grade 12:

a. Whenever the amount of energy in one place or form diminishes, there is an increase of the same amount of energy in other places or forms.

b. Heat energy in a material consists of the disordered motions of its atoms or molecules. In any interactions of atoms or molecules, the statistical odds are that they will end up with less order than earlier, with the result that the heat energy is spread out more evenly. With huge numbers of atoms and molecules, greater disorder is almost certain.

c. Transformations of energy usually produce some energy in the form of heat, which spreads by radiation, conduction, and (sometimes) convection into cooler places. Although just as much total energy remains, its being spread out more evenly means less can be done with it.

d. Different energy levels are associated with different configurations of atoms and molecules. Some changes of configuration require an input of energy, and others release energy.

e. When energy of an isolated atom or molecule changes, it does so in a definite jump from one value to another, with no possible values in between. This kind of change in energy occurs when radiation is absorbed or emitted by isolated atoms or molecules. Consequently, the radiation also has distinct energy values. As a result, the light emitted or absorbed by separate atoms or molecules (as in a gas) can be used to identify what the substance is.

f. Energy is released whenever the nuclei of very heavy atoms, such as uranium or plutonium, split into middleweight ones, or when very light nuclei, such as those of hydrogen and helium, combine into heavier ones. The energy released in a nuclear reaction is very much greater than the energy given off in a chemical reaction.

g. Scientists from different parts of the world made important contributions to the scientific understanding of radioactivity. The Curies made radium widely available, increasing the study of radioactivity and leading to the realization that one kind of atom may change into another kind and so must be made up of smaller parts. Ernest Rutherford of New Zealand and his colleagues discovered that the heavy radioactive element uranium spontaneously splits itself into a slightly lighter nucleus and a very light helium nucleus. Later, Austrian and German scientists showed that when uranium is struck by neutrons, it splits into two nearly equal parts plus one or two extra neutrons. Lisa Meitner pointed out that if these fragments added up to less mass than the original uranium nucleus, then Einstein's special relativity theory predicted that a large amount of energy would be released. Enrico Fermi then showed that the extra neutrons trigger more fissions, creating a sustained chain reaction giving off a prodigious amount of energy. H53.12b

h. The scientific understanding of radioactivity has led to many technological developments, including the nuclear fission bombs dropped on Japan in World War II, later nuclear fusion weapons, nuclear power plants, and various uses of radioactivity in medicine, industry, and different fields of scientific research. H57.12b

i. Albert Einstein formulated the special theory of relativity, which includes the idea that nothing can travel faster than the speed of light, which is the same for all observers no matter how they or the light source happen to be moving. The theory also states that any form of energy has mass and that matter itself is a form of energy. The relativity equation, $E = mc^2$, holds that the transformation of even a tiny amount of matter (m) will release an enormous amount of other forms of energy (E), since the c^2 in the equation stands for the immense speed of light squared.

j. A decade after developing the special theory of relativity Einstein proposed the general theory of relativity, which pictures Newton's gravitational force as a distortion of space and time.

k. Many predictions from Einstein's theories of relativity have been confirmed on both atomic and astronomical scales.

14. Students will be familiar with the wave nature of sound and electromagnetic radiation, and understand the relationship between force, mass, and the motion of objects.

By the end of grade 2:

a. Things move in many different ways, such as straight, zigzag, round and round, back and forth, and fast and slow.

b. Pushing or pulling an object changes its movement.

c. When something makes a sound, it vibrates.

By the end of grade 5:

a. Changes in speed or direction of motion are caused by forces. The greater the force, the greater the change in motion will be. A given force will have less effect on more massive objects.

b. How fast things move differs greatly. Some things are so slow that their movement from place to place takes a long time; others move too fast for people to see.

By the end of grade 8:

a. An unbalanced force acting on an object changes its speed or direction of motion, or both. If the force acts toward a single center, the object's path may curve into an orbit around the center.

b. Vibrations, such as sound and earthquakes, in materials set up wavelike disturbances that spread away from the source. Such disturbances move at different speeds in different materials.

c. Human eyes respond to only a narrow range of wavelengths of electromagnetic radiation-visible light. Differences of wavelength within that range are perceived as differences in color.

d. Light from the sun is made up of a mixture of many different colors of light, even though the light looks almost white. Other things that give off or reflect light have a different mix of colors.

By the end of grade 12:

a. In the seventeenth century, Isaac Newton created a unified view of force and motion in which motion everywhere in the universe can be explained by the same few rules. The Newtonian system was based on the concepts of mass, force, and acceleration, three laws of motion relating them, and a physical law stating that the force of

gravity between any two objects in the universe depends only upon their masses and the distance between them. The system made it possible to account for such diverse phenomena as tides, the orbits of planets and moons, the motion of falling objects, and the earth's equatorial bulge. H47.12d

b. For several centuries, Newton's science was accepted without major changes because it explained so many different phenomena, could be used to predict many physical events (such as the appearance of Halley's comet), was mathematically sound, and had many practical applications. Newton's ideas were improved upon in the twentieth century by Einstein's relativity theory, but even so, they are still widely used, and Newton's influence has extended far beyond physics and astronomy, serving as a model for other sciences.

c. The change in motion of an object is proportional to the applied force and inversely proportional to the mass. M4.12ce

d. Whenever one thing exerts a force on another, an equal amount of force is exerted back on it. M4.12ace

e. All motion is relative to whatever frame of reference is chosen, for there is no motionless frame from which to judge all motion.

f. Accelerating electric charges produce electromagnetic waves around them. There are a great variety of electromagnetic waves: radio waves (longest), microwaves, radiant heat, visible light, ultraviolet radiation, X-rays, and gamma rays (shortest). In empty space, all electromagnetic waves move at the same speed—the "speed of light."

g. The observed frequency of a wave depends upon the relative motion of the source and the observer. If either is moving toward the other, the observed frequency is higher; if either is moving away, the frequency is lower. Because the light seen from almost all distant galaxies has lower frequencies than comparable light here on earth, astronomers believe that the whole universe is expanding.

h. Waves can superpose on one another, bend around corners, reflect off surfaces, be absorbed by materials they enter, and change direction when entering a new material. All these effects vary with wavelength. The energy of waves (like any form of energy) can be changed into other forms of energy.

THE PHYSICAL SETTING

15. Students will recognize gravitational, electrical, and magnetic forces as major kinds of forces acting in nature.

By the end of grade 2:

a. Things near the earth fall to the ground unless something holds them up.

b. Magnets can be used to make some things move without being touched.

By the end of grade 5:

a. The earth's gravity pulls any object toward it.

b. A magnet pulls on all things made of iron and either pushes or pulls on other magnets.

c. Material that has been electrically charged pulls on all other materials and may either push or pull other charged materials.

By the end of grade 8:

a. All objects exert gravitational force on each other. The force depends on how much mass the objects have and how far apart they are. This force is easy to detect only when at least one of the objects has a lot of mass.

b. The sun's gravitational pull holds the earth and other planets in their orbits, just as the planets' gravitational pull keeps their moons in orbit around them.

c. Electric currents and magnets can exert a force on each other.

GRADE 12

By the end of grade 12:

a. Gravitational force is an attraction between masses. The strength of the force is proportional to the masses and weakens rapidly with increasing distance between them. M4.12ace

b. Electromagnetic forces acting within and between atoms are vastly stronger than the gravitational forces acting between the atoms. At the atomic level, electric forces between oppositely charged electrons and protons hold atoms and molecules together and thus are involved in all chemical reactions. On a larger scale, these forces hold solid and liquid materials together and act between objects when they are in contact—as in sticking or sliding friction.

c. There are two kinds of charges—positive and negative. Like charges repel one another, and opposite charges attract. In materials, there are almost exactly equal proportions of positive and negative charges, making the materials as a whole electrically neutral. The negatively charged electrons are far more mobile in materials than the positively charged protons. A very small excess or deficit of negative charges in a material produces noticeable electric forces.

d. Different kinds of materials respond differently to electric forces. In conducting materials such as metals, electric charges flow easily, whereas in insulating materials such as glass, they can hardly move at all. At very low temperatures, some materials become superconductors and offer no resistance to the flow of current. Between these extremes, semiconducting materials differ greatly in how well they conduct, depending on their exact composition.

e. Magnetic forces are very closely related to electric forces and can be thought of as different aspects of a single electromagnetic force. Moving electric charges produce magnetic forces, and moving magnets produce electric forces.

f. The forces that hold the nucleus of an atom together are much stronger than the electromagnetic force. That is why such great amounts of energy are released from the nuclear reactions in the sun and other stars.

THE LIVING ENVIRONMENT

16. Students will be aware of the diversity of living organisms and how they can be compared scientifically.

By the end of grade 2:

a. Some animals and plants are alike in the way they look and in the things they do, and others are very different from one another.

b. Plants and animals have features that help them live in different environments.

By the end of grade 5:

a. Living things can be sorted in many ways, depending on which features are used to decide in what groups they belong.

By the end of grade 8:

a. Organisms are often grouped into plants, which use sunlight to make their own food, and animals, which consume energy-rich foods. Some kinds of organisms cannot be neatly classified as either plants or animals, and many of them are microscopic.

b. Similarities among organisms, including their anatomical features, are used to infer how closely related the organisms are. Biologists consider details of internal and external structures to be more important in classifying organisms than behavior or general appearance.

c. Animals and plants have a great variety of physical features and internal structures that contribute to their ability to make or find food and reproduce.

d. For sexually reproducing organisms, a species comprises all organisms that can mate with one another to produce fertile offspring.

By the end of grade 12:

a. The variation of organisms within a species increases the chances that some members of the species will survive under changed environmental conditions, and a great diversity of species increases the chance that at least some living things will survive even if there are large changes in the environment.

b. The degree of similarity in the DNA sequences of organisms or species can be used to estimate how closely they are related to each other, which often closely matches their classifications based on anatomical similarities.

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17. Students will understand how biological traits are passed on to successive generations.

By the end of grade 2:

a. There is variation among individuals of one kind within a population.

b. Offspring are very much like their parents and like one another, but they are also different.

By the end of grade 5:

a. Some likenesses between children and parents, such as eye color in human beings, or fruit or flower color in plants, are inherited. Other likenesses, such as people's table manners or carpentry skills, are learned.

b. Offspring resemble their parents, due to a reliable way of transferring some characteristics from one generation to the next. M6.5df

By the end of grade 8:

a. In some kinds of organisms, all the genes come from a single parent, whereas in organisms that have sexes, typically half of the genes come from each parent.

b. In sexual reproduction, a single specialized cell from a female merges with a specialized cell from a male. As the fertilized egg, carrying genetic information from each parent, multiplies to form the complete organism with about a trillion cells, the same genetic information is copied in each cell.

c. An inherited trait of an individual can be determined by one or by many genes, and a single gene can influence more than one trait.

d. Selective breeding for particular traits has resulted in new varieties of cultivated plants and domestic animals.

THE LIVING ENVIRONMENT

GRADE 12

By the end of grade 12:

a. New gene combinations may make little difference, may produce organisms with new and perhaps enhanced capabilities, or may lead to detrimental effects.

b. The sorting and recombination of genes in sexual reproduction result in a great variety of possible gene combinations in the offspring of any two parents. M6.12d

c. The information passed from parents to offspring is coded in DNA molecules.

d. Genes are segments of DNA molecules. Inserting, deleting, or substituting DNA segments can alter genes. An altered gene may be passed on to every cell that develops from it.

e. Gene mutations can be caused by such things as radiation and chemicals. When they occur in sex cells, the mutations can be passed on to offspring.

f. The many body cells in an individual can be very different from one another, even though they are all descended from a single cell and thus have essentially identical genetic information. Different parts of that genetic information are used in different types of cells and are influenced by the cell's environment and past history.

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18. Students will be familiar with the structure, functions, and reproduction of living cells.

By the end of grade 2:

a. Most living things need water, food, and air.

By the end of grade 5:

a. Some living things consist of a single cell. Like larger organisms, cells need food, water, and air; a way to dispose of waste; and an environment in which they can live.

b. Living things are made mostly of cells, which can be seen under microscopes. Some organisms are made of a collection of similar cells that benefit from cooperating. Other organisms' cells vary greatly in appearance and perform very different roles in the organism.

By the end of grade 8:

a. All living things are composed of cells, from just one to many millions, whose details usually are visible only through a microscope. Different body tissues and organs are made up of different kinds of cells. The cells in similar tissues and organs in other animals are similar to those in human beings but differ somewhat from cells found in plants.

b. Cells continually divide to make more cells for growth and repair. Various organs and tissues function to serve the cells' need for food, air, and waste removal.

c. Many of the basic functions of organisms—such as extracting energy from food and getting rid of waste—are carried out within cells. Cells function similarly in all living organisms.

d. Water, which accounts for about two-thirds of the weight of cells, gives cells many of their properties.

THE LIVING ENVIRONMENT

GRADE 12

By the end of grade 12:

a. Every cell is covered by a membrane that controls what enters and leaves the cell. In all but quite primitive cells, a complex network of proteins within them provides organization and shape and, for animal cells, movement.

b. Within the cell are specialized parts for the transport of materials, energy capture and release, protein building, waste disposal, information feedback, and even movement. In addition to these basic cellular functions common to all cells, most cells in multicellular organisms perform some special functions that others do not.

c. The work of the cell is carried out by the many different types of molecules it assembles, mostly proteins. Protein molecules are long, usually folded chains made from 20 different kinds of amino-acid molecules. The function of each protein molecule depends on its specific sequence of amino acids, and the chain's shape is a consequence of attractions among the chain's parts.

d. The genetic information in DNA molecules provides instructions for assembling protein molecules. The code used is almost the same for all life forms.

e. Complex interactions among the different kinds of molecules in the cell cause distinct cycles of activities, such as growth and division. Cell behavior can also be affected by molecules from other parts of the organism or even other organisms.

f. Gene mutation in a cell can result in uncontrolled cell division, called cancer. Exposure of cells to certain chemicals and radiation increases mutations and thus increases the chance of cancer. G13.12c

g. Most cells function best within a narrow range of temperature and acidity. At very low temperatures, reaction rates are too slow. High temperatures and extremes of acidity can irreversibly change the structure of most protein molecules. Even small changes in acidity can alter the molecules and how they interact. Both single cells and multicellular organisms have molecules that help to keep the cell's acidity within a narrow range.

h. A living cell is composed of a small number of chemical elements, mainly carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur. Carbon, because of its small size and four available bonding electrons, can join to other carbon atoms in chains and rings to form large, complex molecules.

19. Students will be aware of the dependence of all organisms on one another and their environments.

By the end of grade 2:

a. Animals eat plants or other animals for food and may also use plants (or even other animals) for shelter and nesting.

b. Living things are found almost everywhere in the world. Different kinds of plants and animals live in different places. G8.4b

By the end of grade 5:

a. Some insects and other organisms depend on dead plant and animal material for food. G8.4a

b. Organisms interact with one another in various ways besides providing food. Many plants, for example, depend on animals for carrying their pollen to other plants or for dispersing their seeds. G8.4a

c. Microorganisms have various effects on larger organisms. Many of these effects are beneficial. Most microorganisms do not cause disease.

d. For any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all. Changes in an organism's habitat are sometimes beneficial to it and sometimes harmful. G8.4a; G10.4c

By the end of grade 8:

a. In all environments—freshwater, marine, forest, desert, grassland, mountain, and others—organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter. The growth and survival of organisms depend on the physical conditions in the particular environment. G8.8a

b. Two types of organisms may interact with one another in several ways: They may be in a producer/consumer, predator/prey, or parasite/host relationship, or one organism may scavenge or decompose another. Relationships may be competitive or mutually beneficial. Some species have become so adapted to each other that neither could survive without the other.

THE LIVING ENVIRONMENT

GRADE 12

By the end of grade 12:

a. Ecosystems can be reasonably stable over thousands of years. As any population of organisms grows, it is held in check by one or more environmental factors: depletion of food or nesting sites, increased loss to increased numbers of predators, or parasites. If a disaster such as flood or fire occurs, the damaged ecosystem is likely to recover in stages that eventually result in a system similar to the original one. G8.8b

b. Like many complex systems, ecosystems tend to have cyclic fluctuations around a state of rough equilibrium. In the long run, however, ecosystems always change when climate changes or when one or more new species appear as a result of migration or local evolution. G8.8b; H46.12d

20. Students will understand the cycling of matter and the flow of energy through systems of living things.

By the end of grade 2:

a. Plants and animals both need to take in water. Animals need to take in food, and plants need light.

b. Many materials can be recycled or used again, sometimes in different forms.

By the end of grade 5:

a. Some source of "energy" is needed for all organisms to stay alive and grow.

b. Almost all kinds of animals' food can be traced back to plants.

c. Over the whole earth, organisms are growing, dying, and decaying, and new organisms are being produced by the old ones.

By the end of grade 8:

a. Food provides the fuel and the building material for all organisms. Plants use the energy from light to make sugars from carbon dioxide and water, releasing oxygen. The sugars are food that plants use immediately or store for later use. Organisms that eat plants break down the plant structures to produce the materials and energy they need to survive. Plant-eating organisms are consumed by other organisms, and so on. G8.8b

b. Energy can change from one form to another in living things. Animals get energy from oxidizing their food, releasing some of its energy as heat. Almost all food energy comes originally from sunlight.

c. All organisms are part of and depend on two main interconnected global food webs of plants and animals, one in the ocean and one on land. One includes microscopic ocean plants, the animals that feed on them, and finally the animals that feed on those animals. The other web includes land plants, the animals that feed on them, and the animals that feed on those animals. The cycles continue indefinitely because organisms decompose after death to return food material to the environment. G8.8a

d. Over a long time, matter is transferred from one organism to another repeatedly and between organisms and their physical environment. As in all material systems, the total amount of matter remains constant, even though its form and location change.

e. Water is a solvent. As it passes through the water cycle, it dissolves minerals and gases and carries them to the oceans.

GRADE 12

By the end of grade 12:

a. At times, environmental conditions are such that plants and marine organisms grow faster than decomposers can recycle them back to the environment. Layers of energy-rich organic material have been gradually turned into great coal beds and oil pools by the pressure of the overlying earth. By burning these fossil fuels, people are passing most of the stored energy back into the environment as heat and releasing large amounts of carbon dioxide. G8.8c; G14.8d

b. The amount of life any environment can support is limited by the available energy, water, oxygen, and minerals and by the ability of ecosystems to recycle the residue of dead organic materials. Human activities and technology can change this flow and reduce or increase the fertility of the land. G8.8c and 12ab; G13.12c

c. The chemical elements that make up the molecules of living things pass through food webs and are combined and recombined in different ways. At each link in a food web, some energy is stored in newly made structures, but much is dissipated into the environment as heat. Continual input of energy from sunlight keeps the process going. G8.12ab; G14.8d

21. Students will be familiar with the evolution of life on earth and understand the arguments for natural selection as a scientific explanation of biological evolution.

By the end of grade 2:

a. Different plants and animals have external features that help them thrive in different kinds of places.

b. Some kinds of organisms that once lived on earth have completely disappeared, although they resemble other organisms that are alive today.

By the end of grade 5:

a. Individuals of the same kind differ in their characteristics, and sometimes the differences give individuals an advantage in surviving and reproducing.

b. Fossils can be compared to one another and to living organisms according to their similarities and differences. Some organisms that lived long ago are similar to existing organisms, but some are quite different.

By the end of grade 8:

a. Individual organisms with certain traits are more likely than others to survive and have offspring. Changes in environmental conditions can affect the survival of individual organisms and entire species. G8.8b

b. Small differences between parents and offspring can accumulate (through selective breeding) in successive generations so that descendants are very different from their ancestors.

c. The basic idea of biological evolution is that the earth's present-day species developed from earlier, distinctly different species.

d. Many thousands of layers of sedimentary rock provide evidence for the long history of the earth and for the long history of changing life forms whose remains are found in the rocks. More recently formed rock layers are more likely to contain fossils resembling existing species.

THE LIVING ENVIRONMENT

GRADE 12

By the end of grade 12:

a. The scientific problem that led to the theory of natural selection was how to explain similarities within the great diversity of existing and fossil organisms. Prior to Charles Darwin's work in the nineteenth century, the most widespread belief was that all known species were created at the same time and remained unchanged throughout history. Some scientists also believed that features an individual acquired during its lifetime could be passed on to its offspring, thereby improving the species' ability to survive. In his book *Origin of Species*, published in the mid-1800s, Darwin argued that only biologically inherited characteristics could be passed on to offspring. The book's quick success came from its clear and understandable argument, including its comparison of natural selection to the selective breeding of animals in wide use at the time, and the massive array of supporting biological and fossil evidence it assembled. H20.12b

b. Later support for Darwin's idea of biological evolution has come from the rediscovery of the genetics experiments of an Austrian monk, Gregor Mendel, the identification of genes and how they are sorted in reproduction, and the discovery that the genetic code found in DNA is the same for almost all organisms. Most scientists in the twentieth century accept Darwin's basic idea, although they differ about the details of the process and how rapidly evolution of species takes place. The idea of evolution has also led to religious controversies over its implications. H20.12b

c. Life on earth is thought to have begun as simple, one-celled organisms about 4 billion years ago. During the first 2 billion years, only single-cell microorganisms existed, but once cells with nuclei developed about a billion years ago, increasingly complex multicellular organisms evolved.

d. Evolution builds on what already exists, so the more variety there is, the more there can be in the future. But evolution does not necessitate long-term progress in some fixed direction. Evolutionary changes appear to be like the growth of a bush: Some branches survive from the beginning with little or no change, many die out altogether, and others branch repeatedly, sometimes giving rise to more complex organisms.

e. Molecular evidence supplements the anatomical evidence for evolution and provides additional detail about the sequence in which various lines of descent branched off from one another.

f. The evolutionary mechanism provided by natural selection depends on the variation in heritable characteristics that exists within every species. Some of these characteristics give individuals an advantage over others in surviving and reproducing, and the advantaged offspring, in turn, are more likely than others to survive and reproduce. Over time, the proportion of individuals that have advantageous characteristics will increase.

g. Heritable characteristics can be observed at molecular and whole-organism levels in structure, chemistry, and behavior.

h. Natural selection leads to organisms that are well suited for survival in particular environments. Chance alone can result in the persistence of some heritable characteristics having no survival or reproductive advantage for the organism. When an environment changes, the survival value of some inherited characteristics may change.

22. Students will be aware of the biological, cultural, and social explanations for why human beings have important traits in common yet differ from one another.

By the end of grade 2:

a. People are more like one another than like other animals, even though they have different external features such as the size, shape, and color of hair, skin, and eyes.

b. People need water, food, air, waste removal, and a particular range of temperatures in their environment, just as other animals do.

c. People tend to live in families and communities in which individuals have different roles and depend on other people for various things they need. C12.4c

By the end of grade 5:

a. Much of human behavior is affected by factors other than biological inheritance, unlike many other species.

b. Artifacts and preserved remains provide some evidence of the physical characteristics and behavior of human beings who lived a very long time ago.

By the end of grade 8:

a. Like other animals, human beings have body systems for obtaining and providing energy, defense, reproduction, and the coordination of body functions.

b. Human beings have many similarities that enable them to reproduce and to donate blood and organs to one another throughout the world.

c. Fossil evidence is consistent with the idea that human beings evolved from earlier species.

d. Human beings are able to invent and modify a wider range of social behavior than individuals within other species, whose specialized roles are usually genetically programmed.

GRADE 12

By the end of grade 12:

a. The similarity of human DNA sequences and the resulting similarity in cell chemistry and anatomy identify human beings as a single species.

b. Human beings produce, store, and use exceptionally large amounts of information for a wide variety of purposes, using such technologies as written records and photographic and electronic devices.

c. Human sexual behavior depends strongly on cultural, personal, and biological factors.

23. Students will be familiar with important aspects of human development from fertilization to death.

By the end of grade 2:

a. A human baby grows inside its mother until its birth. Even after birth, a human baby is unable to care for itself, and its survival depends on the care it receives from other people.

By the end of grade 5:

a. It takes about nine months for a human embryo to develop and be born. Embryos are nourished by the mother, so substances she takes in will affect how well or poorly the baby develops.

b. There is a usual sequence of physical and mental development among human beings from fertilization to death, although there is some variation in the age at which individuals' development occurs.

By the end of grade 8:

a. Fertilization occurs when sperm cells from a male's testes are deposited near an egg cell from the female ovary and one of the sperm cells enters the egg cell.

b. Contraception measures may incapacitate sperm cells, block their way to the egg, prevent the release of eggs, or prevent the fertilized egg from implanting successfully.

c. Following fertilization, cell division produces a small cluster of cells that then differentiate by appearance and function to form the basic tissues of an embryo. During the first three months of pregnancy, organs begin to form. During the second three months, all organs and body features develop. During the last three months, the organs and features mature enough to function well after birth. Patterns of human development are similar to those of other vertebrates.

d. The development of the embryo—and later the newborn infant—is affected by its genes and the health and behavior of its mother, including diet and disease.

e. Various body changes occur as adults age. Muscles and joints become less flexible, bones and muscles lose mass, energy levels diminish, and the senses become less acute. Women stop releasing eggs and hence can no longer reproduce. The length and quality of human life are influenced by many factors, including sanitation, diet, medical care, gender, genes, environmental conditions, and personal health behaviors.

By the end of grade 12:

a. As successive generations of an embryo's cells form by division, small differences in their immediate environments cause them to develop slightly differently, by activating or inactivating different parts of the DNA information.

b. The very long period of human development (compared to that of other species) is associated with the prominent role of the brain in human evolution. The ability to learn persists throughout life and may improve as people build a base of ideas and come to understand how to learn well. Human mental abilities that apparently evolved for survival are used for newly invented cultural purposes, such as art, literature, ritual, and games.

HUMAN ORGANISMS AND SOCIETY

24. Students will understand the basic functions of the human body.

By the end of grade 2:

a. Different human body parts are used to seek, find, and take in food—eyes and noses for detecting food, legs to get to it, arms to carry it away, and a mouth to eat it.

b. Senses can warn individuals about danger; muscles help them to fight, hide, or get out of danger.

c. The brain enables human beings to think and also sends messages to other body parts to help them work properly.

d. People use their various senses to find out about their surroundings and themselves. Sometimes a person can get different information about the same thing by moving closer or farther away.

By the end of grade 5:

a. From food, people obtain energy and materials for body repair and growth. The undigestible parts of food are eliminated.

b. By breathing, people take in the oxygen they need to live.

c. Skin protects the body from harmful substances and other organisms and keeps the body from drying out.

d. The brain gets signals from all parts of the body telling what is going on throughout the body. The brain also sends signals to parts of the body to influence what they do.

By the end of grade 8:

a. Organs and organ systems are composed of cells and help to provide all cells with basic needs.

b. For the body to use food for energy and building materials, the food must first be digested into molecules that are absorbed and transported to cells.

c. To burn food for the release of energy stored in it, cells must be supplied with oxygen and have carbon dioxide removed. Lungs take in oxygen for the combustion of food and they eliminate the carbon dioxide produced. The urinary system disposes of dissolved waste molecules, the intestinal tract removes solid wastes, and the skin and lungs rid the body of heat energy. The circulatory system moves all these substances to or from cells where they are needed or produced.

d. Specialized cells and the molecules they produce identify and destroy microbes that get inside the body.

e. Hormones are chemicals from glands that affect other body parts. They help the body respond to danger and regulate human growth, development, and reproduction.

f. Interactions among the senses, nerves, and brain enable human beings to learn ways of coping with changes in their environment.

By the end of grade 12:

GRADE 12

a. The immune system protects against microscopic organisms and foreign substances that enter from outside the body and against some cancer cells that arise within the body.

b. The nervous system works by electrochemical signals in the nerves and from one nerve to the next. The hormonal system exerts its influences through chemicals that circulate in the blood. These two systems also affect each other in coordinating body systems.

c. Communication between cells is required to coordinate their diverse activities. Some cells secrete substances that spread only to nearby cells. Others secrete hormones, molecules that are carried in the bloodstream to widely distributed cells that have special receptor sites to which they attach. Along nerve cells, electrical impulses carry information much more rapidly than is possible by diffusion or blood flow. Some drugs mimic or block the molecules involved in transmitting nerve or hormone signals and therefore disturb normal operations of the brain and body.

25. Students will be familiar with what influences learning in human beings.

By the end of grade 2:

a. Some of the things people do, like playing soccer, reading, and writing, must be deliberately learned. How well one learns sometimes depends on how one performs the activity and how often and how hard one tries to learn.

b. People can learn from each other by telling and listening, showing and watching, and imitating others. A10.4b

By the end of grade 5:

a. Human beings can make judgments about new situations using the memory of their past experiences. A15.4c; C14.8d

b. Many skills can be practiced until they become automatic. If the right skills are practiced, performance may improve.

c. Human beings tend to repeat behaviors that feel good or have pleasant consequences and avoid behaviors that feel bad or have unpleasant consequences. C13.8ab

By the end of grade 8:

a. The level of skill a person can reach in any particular activity depends on innate abilities, practice, and the use of appropriate learning tools and materials.

b. Human beings can detect a tremendous range of sensory stimuli. The strongest stimulus they can tolerate may be more than a trillion times as intense as the weakest they can detect. Still, there are many kinds of signals in the world that people cannot detect directly.

c. Learning often results from two perceptions or actions occurring at about the same time. The more often the same combination occurs, the stronger the mental connection between them is likely to be. Occasionally a single vivid experience will connect two things permanently in people's minds. G4.8d

d. Language and tools enable human beings to learn complicated and varied things from others.

GRADE 12

By the end of grade 12:

a. Differences in the behavior of individuals arise from the interaction of heredity and experience—the effect of each depends on the qualities of the other. Even instinctive behavior may not develop well if the individual is exposed to abnormal conditions.

b. The expectations, moods, and prior experiences of human beings can affect how they interpret new perceptions or ideas. People tend to ignore evidence that challenges their beliefs and to accept evidence that supports them. The context in which something is learned may limit the contexts in which the learning can be used.

c. Human thinking involves both the interaction of ideas and ideas about ideas. People can produce many associations internally without receiving information from their senses.

HUMAN ORGANISMS AND SOCIETY

26. Students will understand how diet, exercise, disease, and toxic substances influence the physical health of individuals.

By the end of grade 2:

a. Eating a variety of healthful foods and getting enough exercise and rest help people to stay healthy.

b. Some things people take into their bodies from the environment can hurt them.

c. Some diseases are caused by germs and may be spread by people who have them. Washing one's hands with soap and water reduces the number of germs that can get into the body or that can be passed on to other people.

By the end of grade 5:

a. Food provides energy and materials for growth and repair of body parts. Vitamins and minerals, present in small amounts in foods, are essential to keep everything working well. As people age, the amounts and kinds of food and exercise needed by the body may change.

b. Tobacco, alcohol, other drugs, and certain poisons in the environment (e.g., pesticides, lead) can harm human beings and other living things.

c. If germs are able to get inside one's body, they may keep it from working properly. For defense against germs, the human body has tears, saliva, skin, blood cells, and stomach secretions. A healthy body can fight most germs that do get inside. However, there are some germs that interfere with the body's defenses.

d. There are some diseases that human beings can catch only once; following recovery, those individuals will not get sick from those diseases again. Vaccinations can prevent people from catching many diseases even once.

By the end of grade 8:

a. The amount of food energy (calories) a person requires varies with body weight, age, gender, activity level, and natural body efficiency. Regular exercise is important to maintain a healthy heart and lung system, good muscle tone, and bone strength.

b. Toxic substances, some dietary habits, and some personal behavior may be bad for one's health. Some effects show up right away; others may not show up for many years. Avoiding toxic substances, such as tobacco, and changing dietary habits to reduce the intake of such things as animal fat increases the chances of living longer.

c. The environment may contain dangerous levels of substances that are harmful to human beings. Therefore, the good health of individuals requires monitoring the soil, air, and water and taking steps to keep them safe.

d. At various times in history, people have held that disease has spiritual causes or comes from an imbalance in the body fluids. In the nineteenth century, Louis Pasteur and others developed germ theory, the idea that microorganisms cause disease. Pasteur found that spoilage and fermentation in things like milk and wine can be stopped by keeping out germs or destroying them with heat and that animal diseases are related to microorganisms. He studied how infections lead the body to build up immunity against later infection and used this to develop the technique of vaccination, which induces the body to build immunity to a disease without actually causing the disease itself. H32.12a; H43.12a

e. White blood cells engulf invading germs, such as viruses and bacteria, or produce antibodies that attack them or mark them for killing by other white cells. The antibodies produced will remain and can fight off subsequent invaders of the same kind.

By the end of grade 12:

a. Some allergic reactions are caused by the body's immune responses to usually harmless environmental substances. Sometimes the immune system may attack some of the body's own cells.

b. Faulty genes can cause body parts or systems to work poorly. Some genetic diseases appear only when an individual has inherited a certain faulty gene from both parents.

c. Some viral diseases, such as AIDS, destroy critical cells of the immune system, leaving the body unable to deal with multiple infection agents and cancerous cells.

27. Students will be aware of physiological and cultural factors that affect individuals' mental health.

By the end of grade 2:

a. People have many different feelings—sadness, joy, anger, fear, etc.—about events, themselves, and other people. A11.4c

b. There are ways that may help people understand their feelings and problems and what to do about them, such as talking with someone.

By the end of grade 5:

a. Different individuals understand and handle their own feelings or behavior differently or have different reactions to the same situation. A11.8b

b. Physical health can affect people's emotional well-being and vice versa.

c. One way to respond to a strong feeling, either pleasant or unpleasant, is to think about what caused it and then consider whether to seek out or avoid similar situations.

By the end of grade 8:

a. Often people react to mental distress or psychological troubles by denying that they have a problem. Sometimes they do not know why they feel the way they do or why they are having difficulty. They may need help to discover the origins of their problems.

b. Both external and internal conditions (body chemistry, personal history, and values) influence how people cope with disturbing emotions or stressful situations.

By the end of grade 12:

a. Some kinds of stress and experiences are especially difficult for children and may have undesirable and long-lasting effects.

b. Biological abnormalities, such as brain injuries or chemical imbalances, can cause or increase susceptibility to psychological disturbances.

c. Other people's reactions to an individual's emotional disturbance may lessen, alter, or increase its effects.

d. Ideas about what constitutes good mental health and proper treatment for abnormal mental states vary from one culture to another and from one time period to another.

28. Students will be familiar with how groups, cultural beliefs, and social settings influence individual behavior.

By the end of grade 2:

a. People belong to groups by birth, by having characteristics in common, by joining them, or by being assigned to them.

b. Different families, classrooms, and societies have different rules and patterns of behavior for their members. C2.4b; C7.4a; F1.4d

By the end of grade 5:

a. When acting together, members of a group and even people in a crowd sometimes do and say things that they would not do or say on their own.

b. What is considered acceptable human behavior varies from group to group, from culture to culture, and from one time period to another, but there are some behaviors that are unacceptable in almost all cultures, past and present. A11.8b; E3.4d; F4.8b

By the end of grade 8:

a. Affiliation with a group can increase the power of members through pooled resources and concerted action. Joining a group often has personal advantages, such as companionship, a sense of identity, and recognition by others inside and outside the group.

b. Each culture has distinctive patterns of behavior. Within a large society, there may be many groups, with distinctly different subcultures associated with region, ethnic origin, or social class. A11.8b; E3.8g; F4.8a

c. Although within any society there is usually broad general agreement on what behavior is unacceptable, the standards used to judge and punish behavior vary in different settings and different subgroups, and they may change with time and different political and economic conditions. C12.8c; E4.8c; H32.12f

HUMAN ORGANISMS AND SOCIETY

By the end of grade 12:

a. The behavior of a group may not be predictable from an understanding of each of its members.

b. Social organizations may serve business, political, or social purposes beyond those for which they officially exist, including unstated ones such as excluding certain categories of people from activities.

c. Conflict within a group may be reduced by conflict between it and other groups.

d. Cultural beliefs strongly influence the values and behavior of the people who grow up in the culture, often without their being fully aware of it. E3.12eg; F4.12ac; F9.8a

e. Social distinctions are a part of every culture but take many different forms, ranging from rigid classes based solely on parentage to gradations based on the acquisition of skill, wealth, or education. Differences in speech, dress, behavior, or physical features are often taken by people to be signs of social class. F4.12a; F5.12a

f. Heredity, culture, and personal experience interact in shaping human behavior. F4.12ac; F9.8ab

29. Students will understand how technologies are developed and used to investigate and change the world.

By the end of grade 2:

a. Tools and machines are invented and used to do things that could not be done before or to do things better or more easily. M7.3bc

b. Conditions sometimes keep people from making and using everything they design.

By the end of grade 5:

a. Any invention is likely to lead to other inventions. Once an invention exists, people are likely to find new ways to use it.

b. Scientific laws, engineering principles, properties of materials, and construction techniques are part of the design of engineering solutions to problems. Other factors must also be considered, such as cost, safety, appearance, environmental impact, and what will happen if the solution fails.

c. Designs that are best in one respect (safety or ease of use, for example) may be inferior in other ways (cost or appearance). Depending on the purpose, some designs may be better than others overall.

d. Even a good design may fail. Steps may be taken ahead of time to reduce, but not eliminate, the likelihood of failure.

By the end of grade 8:

a. All technologies have effects other than those intended by the design, some of which may not have been predictable. G6.8b

b. Design usually requires taking various constraints into account. Some constraints are physical, such as gravity or the properties of the materials, while others may be economic, political, social, or ethical. M4.8c; M8.8a

c. Almost all control systems have inputs, outputs, and feedback. Control systems compare information about what is happening to what is intended to happen and then make appropriate adjustments.

d. Systems can fail due to faulty or poorly matched parts, poor design, or how they are used. Failures may be prevented by pretesting parts and procedures, overdesign, and redundancy.

TECHNOLOGY AND ITS APPLICATIONS

GRADE 12

By the end of grade 12:

a. Technological problems often create a demand for new scientific knowledge, and new technologies make it possible for scientists to extend their research in new ways or to undertake entirely new lines of research. New technology itself often sparks scientific advances.

b. The design of a device or process should take into consideration how it will be manufactured, operated, maintained, replaced, and disposed of. Designs should also consider who will sell, operate, and take care of it, and the possible constraints introduced by the costs of these various functions.

c. Complex systems have layers of controls. Some controls operate particular parts of the system and some control other controls. Even fully automatic systems require human control at some point.

d. The more parts and connections a system has, the more ways it can go wrong. Complex systems usually have components to detect, back up, bypass, or compensate for minor failures.

e. To reduce the chance of system failure, performance testing is often conducted using small-scale models, computer simulations, analogous systems, or just the parts of the system thought to be least reliable. M6.12c; M7.12ac

f. Risk analysis is used to minimize the likelihood of unwanted side effects of a new technology. The public perception of risk may depend, however, on psychological factors as well as scientific ones. M6.12d; M7.12ac

30. Students will understand how technology shapes social, cultural, economic, and ecological aspects of human life and has influenced history.

By the end of grade 2:

a. People invent new ways to get work done and solve problems. The tools and ways of doing things that people have invented affect all aspects of life.

b. When people want to build something or try something new, they should try to figure out ahead of time how it might affect other people. G6.4b

By the end of grade 5:

a. Technology has been part of life throughout human history. Like language, ritual, commerce, and the arts, technology is an intrinsic part of human culture, and it both shapes society and is shaped by it. The technology available to people greatly influences what their lives are like. H10.4b; H19.12a; H28.12c; H36.12b; H38.12bd; H53.12b; H59.12d

b. Technology extends the ability of people to change the world: to cut, shape, or put together materials; to move things from one place to another; and to reach farther with their hands, voices, senses, and minds. The changes may be for survival needs such as food, shelter, and defense, for communication and transportation, or to gain knowledge and express ideas. G6.4d; G11.4b; G13.4b; H10.4c; H19.12a; H28.12c; H36.12b; H38.12bd; H53.12b; H59.12d

c. Transportation, communications, nutrition, sanitation, health care, entertainment, and other technologies give large numbers of people today the goods and services that once were luxuries enjoyed only by the wealthy. These benefits are not equally available to everyone. G11.4b; G13.4b; H19.12ac; H28.12c; H36.12b; H38.12bd; H53.12b; H59.12ad

d. Because of their ability to invent tools and processes, people have an enormous effect on their environment, including the lives of other living things. G6.4bd; G13.4b; H59.12c

TECHNOLOGY AND ITS APPLICATIONS

GRADE 8

By the end of grade 8:

a. Technology has strongly influenced the course of history and continues to do so. It is largely responsible for the great revolutions in agriculture, manufacturing, sanitation and medicine, warfare, transportation, information processing, and communications that have radically changed how people live. G6.8b; G9.12c; G11.8e; G13.8b; H15.12a; H19.12ac; H27.12bc; H28.12c; H32.12c; H36.12b; H38.12bd; H47.12d; H50.12a; H53.12b; H56.12c; H57.12b; H59.12d

b. Engineers, architects, and others who engage in design and technology use scientific knowledge to solve practical problems. G13.8c; H28.12c; H59.12d

c. New technologies increase some risks and decrease others. Some of the same technologies that have improved the length and quality of life for many people have also brought new risks.

d. Societies influence how technology is developed and used and are responsible for its effects. G6.8h; H19.12d; H59.12c

GRADE 12

By the end of grade 12:

a. Technology usually affects society more directly than science does because technology solves practical problems and serves human needs (and may create new problems and needs). In contrast, science affects society mainly by stimulating and satisfying people's curiosity and occasionally by enlarging or challenging their views of what the world is like. G9.12c; H59.12de

b. Social and economic factors, such as market forces, government regulation, and media interests, strongly influence the development and use of technologies. C9.12ae; G13.12c

c. Policy decisions concerning the development and use of technology include consideration of alternatives, risks, costs, resources, and benefits. G13.12bc; H59.12c

d. The uses of technology have a major impact on other species in many ways: reducing the amount of the earth's surface available to other species, interfering with food sources, changing the temperature and chemical composition of habitats, introducing foreign species into ecosystems, and altering organisms directly through selective breeding and genetic engineering. G8.12c; G13.12ad; H19.12d; H59.12ac

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e. Technological developments in health and medicine have raised issues with social, moral, ethical, religious, and legal implications. Technological changes have dramatically recast such fundamental issues as the artificial control and prevention of human reproduction, the prospects for genetic engineering, the cost of health care, and the use of technologies to maintain, prolong, or terminate life. H59.12d

TECHNOLOGY AND ITS APPLICATIONS

31. Students will be familiar with important aspects of the agricultural and manufacturing revolutions.

GRADE 2

By the end of grade 2:

a. Most food comes from farms either as crops or as the animals that eat the crops. To grow well, plants need warmth, light, nutrients, and water and protection from weeds and pests. G13.4a

b. Machines improve what people get from crops by helping in planting and harvesting, in keeping food fresh by packaging and cooling, and in moving it long distances from farms to where people live. G13.4b

c. Some materials are better than others for making any particular thing. Materials that are better in some ways (such as stronger, cheaper, or reusable) may be worse in other ways (heavier or harder to cut). G13.4a

GRADE 5

By the end of grade 5:

a. The kinds of crops and animals that can grow in an area depend on the climate and soil. Irrigation, fertilizers, and pesticides can help crops grow in places where there is too little water, poor soil, or crop-eating organisms, but these strategies may lead to environmental problems. G6.4b; G8.4c and 8a; G13.4ae

b. Technology has increased the efficiency of agriculture and the transportation of food. Various ways of treating food slow down the spoiling effects of microorganisms, making it possible to store and transport food long distances. G11.4b; G12.4b

c. People use technology to create useful materials that do not appear in nature (such as steel, nylon, and liquid crystals) and to process or combine natural materials (such as wood, clay, cotton, and animal skins) to improve their properties.

d. Mass production reduces the time and cost involved in making a product. Although many things are still made by hand in some parts of the world, people in technologically developed countries usually produce things by using automatic machines. H53.12b

e. Discarded products contribute to waste disposal problems, especially if the materials in them are harmful or hard to recycle into new products. G6.4bd; G8.4c; G13.4b

By the end of grade 8:

a. Early in human history, there was an agricultural revolution in which people changed from hunting and gathering to farming. This allowed changes in the division of labor between men and women and between children and adults and led to the development of new patterns of society. G10.8d; H33.12b

b. Crop specialization, selective breeding, and long-distance food transportation serve to increase agricultural productivity, but they also create different risks and costs for producing food, and they make people more dependent on one another. G6.8d; G10.8b; G11.8e; H59.12a

c. Technology, including automation, has changed the nature of work in agriculture and manufacturing. Rather than planting or harvesting such products as food, fiber, and fuel, most workers are engaged in processing, packaging, transporting, and selling what is produced. Automation generates high-skill, high-knowledge jobs in such areas as engineering, computer programming, and quality control, which changes the skills required of workers. G11.8e; G10.8e; H59.12c

d. Manufacturing usually involves a series of steps, such as designing a product, obtaining and preparing raw materials, processing the materials mechanically or chemically, and assembling, testing, inspecting, and packaging.

e. Modern technology reduces manufacturing costs, produces more uniform products, and creates new synthetic materials, improving product quality and availability and sometimes helping to conserve natural resources.

TECHNOLOGY AND ITS APPLICATIONS

GRADE 12

By the end of grade 12:

a. In the past century, agricultural technology led to a huge shift of population from farms to cities and a great change in how people live and work. G6.12cd; G10.12be; H19.12abc; H53.12b

b. Scientific research has led to technological advances in agriculture and manufacturing. New varieties of farm plants and animals have been engineered by manipulating their genetic instructions to produce new characteristics, and new materials and new uses for known materials have been discovered through knowledge of the molecular structure of materials.

c. Waste management includes considerations of quantity, safety, degradability, and cost. It requires social and technological innovations because waste-disposal problems are political and economic as well as technical. G8.12c; G9.12g; H59.12c

32. Students will be familiar with the various sources of energy and with their uses and conservation.

By the end of grade 2:

a. People burn fuels such as wood, oil, coal, and natural gas or use electricity to produce light, cook their food, warm their houses, and run machines. G13.4a; G14.4ab

b. People can save energy by turning off machines when they are not using them.

By the end of grade 5:

a. Moving air and water can be used to run machines. G13.4a; G14.4ab

b. The sun is the main source of energy for people, and they use that energy in various ways. The energy in fossil fuels, such as oil and coal, comes from the sun indirectly, because the fuels come from plants that lived long ago. G13.4a; G14.4a

c. People try to conserve fossil fuels or use alternate forms of energy in order to slow down the depletion of energy resources, reduce pollution, or save money. G14.4bde

By the end of grade 8:

a. Electrical energy can be produced from a variety of energy sources, distributed quickly and conveniently to distant locations, and then transformed into other useful forms of energy. G14.8a

b. Energy from the sun (and the wind and water energy derived from it) is available indefinitely. Because the flow of energy is weak and variable, very large collection systems are needed. G14.8a

c. Different parts of the world have different amounts and kinds of energy resources to use and use them for different purposes. Manufacturing and other technological activities are often performed at a site close to an energy source. G11.8bc; G14.8ae

d. Different ways of obtaining, transforming, and distributing energy have different environmental consequences. G13.8af; G14.8d; H59.12c

TECHNOLOGY AND ITS APPLICATIONS

GRADE 12

By the end of grade 12:

a. The interplay of electric and magnetic forces is the basis for electric motors, generators, and many other modern technologies, including the production of electromagnetic waves.

b. Nuclear reactions release energy without the combustion products of burning fuels, but the radioactivity of fuels and by-products poses other risks, which may last for thousands of years. G8.12c; G14.12bcd; H59.12c

c. Industrialization brings an increased use of energy. Such usage contributes to higher productivity, which may lead to a higher standard of living in the industrially developing nations but also leads to more rapid depletion of the earth's energy resources and to environmental risks associated with the use of fossil and nuclear fuels. G8.12c; G14.12bcd; H59.12c

d. Decisions about which fuels to use or whether to slow the depletion of energy sources through more efficient technology can be made at many levels, from personal to national, and nearly always involve trade-offs. G14.12bcd; H59.12c

33. Students will understand the nature of information and communications technologies and their impact on human life.

By the end of grade 2:

a. There are different ways to organize things so they can be easily found and used later.

b. Messages can be sent and received in many different ways, each of which has advantages and disadvantages.

By the end of grade 5:

a. People have always tried to communicate with one another. Signed and spoken language were some of the first inventions. Early forms of recording messages used markings on materials such as wood or stone.

b. Communication involves coding and decoding information. In any language, both the sender and the receiver have to know the same code.

c. Computers can be programmed to store, retrieve, and perform operations on information. These operations include mathematical calculations, word processing, diagram drawing, and the modeling of complex events. S7.5b

d. Communication technologies make it possible to send and receive information more and more reliably, quickly, and cheaply over long distances.

TECHNOLOGY AND ITS APPLICATIONS

GRADE 8

By the end of grade 8:

a. The uses of a large collection of information depend upon how it is organized. Computers are able, on command, to reorganize information in a variety of ways, thereby enabling people to make more and better uses of the collection. M7.8ac

b. Computer control of mechanical systems can be much quicker than human control. Most complex systems still require human oversight, however, to make certain kinds of judgments about whether the parts of the system (including the computers) and the system as a whole will operate properly, to react to unexpected failures, and to evaluate how well the system is serving its intended purposes.

c. Errors can occur in coding, transmitting, or decoding information, and some means of checking for accuracy is needed.

d. Information can be carried by many media, including sound, light, and objects. In this century, the ability to code information as electric currents in wires, electromagnetic waves in space, and light in glass fibers has made communication millions of times faster than is possible by mail or sound.

GRADE 12

By the end of grade 12:

a. Almost any information can be transformed into electrical signals. A weak electrical signal can be used to shape a stronger one, which can control other signals of light, sound, mechanical devices, or radio waves.

b. The quality of communication is determined by the strength of the signal in relation to the noise that tends to obscure it. Communication errors can be reduced by boosting and focusing signals, shielding the signal from internal and external noise, and repeating information, but all of these increase costs. Digital coding of information (using only 1's and 0's) makes possible more reliable transmission of information.

c. Computer modeling explores the logical consequences of a set of instructions and a set of data. The instructions and data input of a computer model try to represent the real world so the computer can show what would actually happen in a given situation. In this way, computers assist people in making decisions by simulating the consequences of different possible decisions. M7.12a

34. Students will be aware of the advantages and limitations of health technologies and the social and moral issues they raise.

By the end of grade 2:

a. Sanitary practices, vaccinations, and other scientific treatments protect people from getting certain diseases, and different kinds of medicines may help those who do become sick to recover.

By the end of grade 5:

a. Tools, such as thermometers and x-ray machines, provide clues about what is happening inside the body.

b. Technology has made it possible to repair and sometimes replace some body parts.

By the end of grade 8:

a. Sanitation measures, such as the use of sewers, landfills, quarantines, and safe food-handling, are important in controlling the spread of organisms that cause disease. Improving sanitation to prevent disease has contributed more to saving human life than any advance in medical treatment.

b. The ability to measure the level of substances in body fluids has made it possible for physicians to make comparisons with normal levels, diagnose problems, and monitor the effects of the treatments they prescribe.

c. Technology makes it possible to manufacture chemical substances such as insulin and hormones that are normally found in the body. They can be used by individuals whose own bodies cannot produce the amounts required for good health.

d. Inoculations use weakened germs (or parts of them) to stimulate the body's immune system to react. This reaction prepares the body to fight subsequent invasions by actual germs of that type.

TECHNOLOGY AND ITS APPLICATIONS

By the end of grade 12:

a. Knowledge of genetics is opening new fields of health care. In diagnosis, mapping of genetic instructions in cells makes it possible to detect defective genes that may lead to poor health. In treatment, substances from genetically engineered organisms may reduce the cost and side effects of replacing missing body chemicals.

b. Knowledge of molecular structure and interactions aids in synthesizing new drugs and predicting their effects.

c. Biotechnology has contributed to improved health in many ways, but its cost and application have led to a variety of controversial social and ethical issues.

Appendix A

A list of organizations whose work formed the basis for *Standards for Excellence in Education*

Arts

Music Educators National Conference (MENC)
1806 Robert Fulton Drive
Reston, VA 22091

The arts standards were developed by MENC in coordination with the American Alliance for Theatre and Education, the National Art Education Association, and the National Dance Association.

Contact: Peggy Senko - *Director of Publications*

Civics and Government

Center for Civic Education
5146 Douglas Fir Road
Calabasas, CA 91302-1467
Contact: Charles Quigley - *Executive Director*

English Language Arts

California
Commission for the Establishment
of Academic Content and Performance Standards
801 K Street, Suite 912
Sacramento, CA 95814
Contact: Scott Hill - *Executive Director*

Massachusetts
The Commonwealth of Massachusetts
Department of Education
350 Main Street
Malden, MA 02148-5023
Contact: Frank W. Haydu III - *Commissioner of Education (Interim)*

Foreign Languages

American Council on the Teaching of Foreign Languages
6 Executive Plaza
Yonkers, NY 10701-6801
Contact: Jamie Draper - *Consultant*

Geography

National Council of Geographic Education
Geography Standards Project
1600 M Street, NW
Washington, DC 20036

The geography standards were developed in coordination with the Association of American Geographers, the National Geographic Society, and the American Geographical Society.

Contact: Anthony DeSouza - *Executive Director*

History

National Center for History in the Schools
University of California, Los Angeles
1100 Glendon Avenue, Suite 927
Box 951588
Los Angeles, CA 90095-1588

Mathematics

The SEE mathematics standards were developed using the mathematics standards from the departments of education of Delaware, New Jersey, and Pennsylvania.

Delaware
Delaware State Department of Education
P.O. Box 1402
Townsend Building #279
Federal and Lockerman Streets
Dover, DE 19903
Contact: Iris Metts - *Secretary of Education*

New Jersey
New Jersey State Department of Education
River View Executive Plaza, Building 100
P.O. Box 500
Trenton, NJ 08625-0500
Contact: Leo F. Klagholz - *Commissioner of Education*

Pennsylvania
Pennsylvania State Department of Education
333 Market Street
Harrisburg, PA 17126-0333
Contact: Eugene W. Hickock - *Secretary of Education*

Science

American Association for the Advancement of Science
Project 2061
1333 H Street, NW
Washington, DC 20005
Contact: Mary Koppal - *Communications Director*

Appendix B

How to order copies of the standards on which *Standards for Excellence in Education* is based

Arts

National Standards for Arts Education
MENC Publications Sales
1806 Robert Fulton Drive
Reston, VA 22091
1-800-828-0229

Civics

National Standards for Civics and Government
Center for Civic Education
5146 Douglas Fir Road
Calabasas, CA 91302-1467
818-591-9321

The standards are also available on the Center for Civic Education's website at http://www.civiced.org.

English Language Arts

California Language Arts Content Standards
California State Board of Education
721 Capitol Mall
Sacramento, CA 95814
916-657-5478

The standards are also available on the California Department of Education's website at http://www.cde.ca.gov.

Massachusetts English Language Arts Curriculum Framework
The Commonwealth of Massachusetts
Department of Education
350 Main Street
Malden, MA 02148-5023
781-388-3396

The standards are also available on the Massachusetts Department of Education's website at http://info.doe.mass.edu.

Foreign Languages

Standards for Foreign Language Learning: Preparing for the 21st Century
National Standards Report
P.O. Box 1897
Lawrence, KS 66044
913-843-1221
Fax: 913-843-1274
Credit card users may call 1-800-627-0629.

Geography

Geography for Life: National Geography Standards, 1994
16A Leonard Hall
Indiana University of Pennsylvania
Indiana, PA 15705
724-357-6290
Fax: 724-357-7708

History

National Standards for History, Basic Edition
National Center for History in the Schools
University of California, Los Angeles
1100 Glendon Avenue, Suite 927
Box 951588
Los Angeles, CA 90095-1588
Fax: 310-794-6740

Mathematics

The SEE mathematics standards were developed using the mathematics standards from the departments of education of Delaware, New Jersey, and Pennsylvania.

Delaware Mathematics Curriculum Framework
Delaware State Department of Education
P.O. Box 1402
Townsend Building #279
Federal and Lockerman Streets
Dover, DE 19903

The standards are also available on the Delaware Department of Education's website at http://www.doe.state.de.us.

Appendix B

New Jersey Core Curriculum Content Standards for Mathematics
New Jersey State Department of Education
River View Executive Plaza, Building 100
P.O. Box 500
Trenton, NJ 08625-0500

The standards are also available on the New Jersey Department of Education's website at http://www.state.nj.us/education/.

Pennsylvania Mathematics Curriculum Framework
Pennsylvania State Department of Education
333 Market Street
Harrisburg, PA 17126-0333

The standards are also available on the Pennsylvania Department of Education's website at http://www.cas.psu.edu/pde.htm.

Science

Benchmarks for Science Literacy
American Association for the Advancement of Science
Project 2061
1333 H Street, NW
Washington, DC 20005

Standards for Excellence in Education Advisory Group

Ms. Patte Barth
Senior Associate
Education Trust

Mr. Dale A. Beames
Physics and Computer Teacher
Coral Springs (FL) High School

Ms. Beverly Bimes-Michalak
Director, CBE Writing to Learn

Dr. Rodger W. Bybee
National Research Council

Dr. Michael D. Casserly
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Dr. Roger Downs
Department of Geography
Pennsylvania State University

Dr. Martha Jacobs Fields
Executive Director
National Association of State
Directors of Special Education

Dr. Pascal D. Forgione, Jr.
Commissioner
National Center for Education Statistics

Mrs. Maxine Pierce Frost
Riverside (CA) Board of Education

Mrs. Harriet Mayor Fulbright

Mr. Dennis Gray
Executive Director
The Education Enhancement Partnership

Mr. Geof Hewitt
Writing/Secondary English Consultant
VT Department of Education

Mr. Douglas R. Jones
Idaho House of Representatives

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Director, New American Schools/Maryland

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Editor, *Kenyon Review*

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Education Trust

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Director (ret.)
National Center for History in the Schools

Ms. Joan Peterson
Director, National Board Certification/Art
WestEd

Mr. Charles N. Quigley
Executive Director
Center for Civic Education

Dr. Carolynn Reid-Wallace
Senior Vice President for Education
Corporation for Public Broadcasting

Dr. Lauren Resnick
Learning Research and Development Center
University of Pittsburgh

Dr. Thomas A. Romberg
NCRMSE

Dr. F. James Rutherford
Chief Education Officer (ret.)
American Association for the Advancement
of Science

Ms. Chris Stewart
Curriculum Specialist
District of Columbia Public Schools

Ms. Susan Traiman
Director, Education Initiative
The Business Roundtable

Ms. Harriet Tyson
Education Author and Consultant

Ms. Ruth Wattenberg
Deputy Director, Educational Issues Department
American Federation of Teachers

Mr. Thomas E. Welch
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East Jessamine (KY) High School

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